Mariners Weather Log

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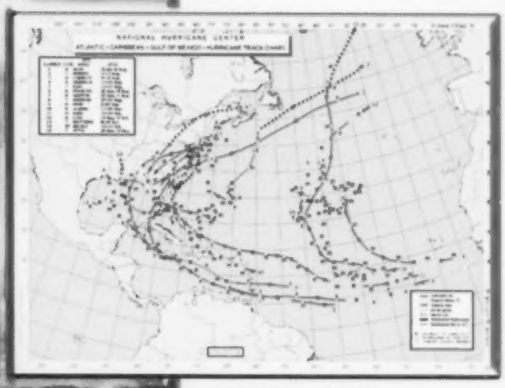
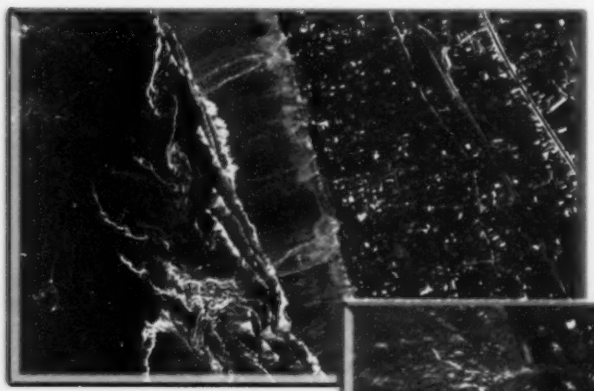


2004 Atlantic Hurricane Storm Track

Hurricanes to Tsunamis



Sri Lanka—Tsunami Waters Receding and Beach Damage

a year of extreme events

Tsunami images courtesy of DigitalGlobe December 26, 2004

Mariners Weather Log

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Hello, and welcome to another exciting issue of the Mariners Weather Log (MWL.) It only seems like yesterday that I was wishing all of you a happy holiday season and looking forward to all the festivities that were coming my way. Well, time stands still for no one so let's take a look at what is in this springtime issue of the MWL.

This was a year of extreme weather and natural disaster related events. This issue has several interesting articles that cover the gambit from the multiple hurricanes making landfall in Florida, typhoons in the Pacific, to the tsunamis in the Indian Ocean. We also offer some updated information regarding the new Port Security guidelines, the use of QuikScat satellite imagery in forecasting tropical systems, some new information regarding the AMVER program, and of course, our Voluntary Observing Ship (VOS) program award winners for 2004.

I kept my introduction short this time to make room for all the great stories to follow. So, I hope you enjoy this offering and I look forward to your comments and reviews of the MWL.

Best Regards—Luke ⚓

Some Important Web Page Addresses

NOAA	http://www.noaa.gov
National Weather Service	http://www.nws.noaa.gov
National Data Buoy Center	http://www.ndbc.noaa.gov
AMVER Program	http://www.amver.com
VOS Program	http://www.vos.noaa.gov
SEAS Program	http://seas.amverseas.noaa.gov/seas/seasmain.html
Mariners Weather Log	http://www.vos.noaa.gov/mwl.shtml
Marine Dissemination	http://www.nws.noaa.gov/om/marine/home.htm
U.S. Coast Guard Navigation Center	http://www.navcen.uscg.gov/marcomms/

See these Web pages for further links.

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Maritime Security and Beyond

Carroll Ward, Certified Protection Professional, Department of Commerce, Office of Security Regional Security Officer

Introduction

In the past year several Port Meteorological Officers (PMO) have requested assistance with compliance issues associated with the new maritime/port security initiatives at their duty locations. I want to take this opportunity to let you know that you are not alone. Although, the new maritime security initiatives were developed to be consistent across the nation, implementation may be quite different at each port. For that reason, I will only write about the new security program initiatives in general. I hope the information in this article will give you a broader picture of what the current national and global maritime security initiatives are, so that you will have a better understanding of potential security changes in your geographic area and an insight as to how the changes may affect your operation. Anytime you are confronted with security issues, please do not hesitate to contact your servicing security office for assistance. The first steps for a smooth transition into the new maritime security requirements at your specific port facility is to understand what is at risk, develop a strong relationship with your Port Authority Office, and know what can be expected if the current threat level in your area is raised.

What's At Risk

America's coasts, rivers, bridges, tunnels, ports, ships, military bases, and waterside industries may be the terrorists' next targets. The overall risk associated with the vulnerability of the U.S. maritime assets, both as a potential target for terrorist activity and more importantly as a transportation platform for the introduction of a "Trojan Horse," in which a potential weapon of mass destruction (WMD), terrorist, contraband or illegal aliens, enters the U.S. through its seaports, has been made very clear in the last several years. A catastrophic event at a seaport facility would not only affect the global transport infrastructure, but could also result in global economic devastation for a long period of time.

To better understand the total complexity of the problem and the global economic implications, consider the following facts provided by the United States Coast Guard in April 2004.[1]

- Until 9/11, the focus of maritime industry was on efficiency, not security
- Over 95% of non-North American trade enters through U.S. seaports (9 million containers)
- Accounts for 2 billion tons and $800 billion of domestic and international freight annually
- 26,000 miles of commercial waters serving 361 ports—over 5,000 marine terminals
- 3.3 billion barrels of oil imported annually
- 6 million cruise ship passengers carried each year from U.S. ports
- Ferry systems transport 180 million passengers annually
- 110,000 commercial fishing vessels that contribute $111 billion to state economies
- 8,000 foreign vessels make 50,000 port calls annually
- Container traffic figures for world ports indicate over 264 million containers were handled in 2002
- Approximately 70 million recreational boats in the United States
- Domestic and international trade expected to double in next 20 years

Severity Of Threat		
	Highest	Weapons Of Mass Destruction • Nuclear • Chemical • Biological • Radiological • High quantities of explosives
		Direct-threat Contraband (e.g., components of WMD, explosives)
		Direct-threat Illegal immigrants (e.g., terrorist operatives)
		Indirect-threat contraband (e.g., money, drugs, weapons intended to contribute to terrorist activities)
		Economic illegal immigration (e.g., undocumented workers)
	Lowest	Economic contraband (e.g., cigarettes, counterfeit CDs, etc.)Pilferage/theft

U.S. Maritime Law Enforcement Authority

As the Nation's lead agency for maritime law enforcement and the nation's "maritime first responder," the Department of Homeland Security's (DHS) U.S. Coast Guard (USCG) vessels and aircraft patrol both our offshore and coastal regions. The USCG has pushed our borders out and extended our vigilance and awareness of potential approaching threats, enforcing U.S. immigration policies, customs laws, and stopping drug smugglers, all of which strengthen our nation's maritime homeland security. The USCG works in interagency teams with its homeland security partners, such as U. S. Customs, Immigration, Department of Defense, and state and local authorities, to help identify threats far off our coasts and help secure our maritime borders and our homeland. After the catastrophic events of 11 September 2001, many new security initiatives were implemented. If you work on or around the waterfronts of America you probably can attest to some of the changes in seaport, waterway and coastal security protocols.

Building a comprehensive security strategy to protect our seaports, waterways and coastal area is not an easy task. The process of identifying vulnerabilities and implementing security countermeasures in such a complicated global system can only be achieved with total global involvement. International collaboration between the U.S., other Countries, International Organizations and the Import/Export Trade Community has responded and established consistent international policy and security protocols, reducing the overall security risk, and at the same time ensuring that disruption to global trade industry was kept to a minimum.

What is the Threat?

Before 9-11, threats to our nation were always identified as part of the routine security assessment process. To many people, these threats were perceived as possible, but not likely to happen. Only after 9-11, did we as a country recognize that our nation is at a very high-risk to real threats that could result in catastrophic loss of life and loss of national critical infrastructure capabilities. ***Table 1*** identifies what many of us in the security community believe to be the threats ranked from highest to lowest in order of severity.

National Comparison Maritime Security (MARSEC) Condition Levels to the Homeland Security Alert System (HSAS)

MARSEC Levels	HSAS Condition	Scope	Anticipated Duration	Nature of Threat	Emphasis	Sample Measures
MARSEC III	Severe	Multiple ports	Up to 30 days	Incident imminent; response to specific event or intelligence	Protection and response	Control access to port
MARSEC II	High	Up to Nationwide	Up to 60 days	Non-specific threat based on intelligence or other warning	Heightened deterrence and detection	Increase random security boardings
MARSEC I	Elevated Guarded Low	Nationwide	Continuously	General threat against ports, harbors, waterways, and approaches	Heightened awareness and preparedness — Baseline deterrence and detection	"New Normalcy"

National Comparison Maritime Security (MARSEC) Condition Levels to the Homeland Security Advisory System (HSAS)

To describe increasing threat levels and to identify corresponding activities to meet the threat, the USCG established Maritime Security (MARSEC) levels I, II, and III. These MARSEC levels are tied to the DHS Homeland Security Advisory System (HSAS). The table below compares the Coast Guard's MARSEC levels to the DHS HSAS. It is important that you understand what specific security measures will be put in place for your specific location based on the assigned MARSEC level. You can get this information from your Port Authority.

U.S. and Global Community Response to Maritime Security After 9–11

While the International Maritime Organization (IMO), an international organization with U.S. representation, worked to develop the International Ship and Port Facility Security Code (ISPS), the U.S. drafted the Maritime Transportation Security Act of 2002 (MTSA). Both required total implementation by July 1, 2004. Every day, we know that our adversaries are changing their strategies based on how we change. Both science and technology are key to winning this new kind of war. Partnerships with other Governments, national laboratories, universities and research centers assist us in staying ahead of the threat. We are developing new resources for detecting the presence of nuclear materials in shipping containers and vehicles. We have deployed the next generation of biological and chemical countermeasures and broad-based detection tools, which are sensitive enough to not only alert people to the presence of dangerous pathogens, but also facilitate evacuation.

The ISPS Code was agreed to by 102 countries. It detailed security-related requirements for all Governments, port authorities and shipping companies with a series of guidelines about how to meet these requirements. The United Nations General Assembly adopted a resolution on the Oceans and the law of the sea, specifically welcoming initiatives by the International Maritime Organization to counter the threat to maritime security from terrorism and to encourage States to fully support this endeavor.

The MTSA was signed on November 25, 2002 and is designed to protect U.S. ports and waterways from a terrorist attack. This law is the U.S. equivalent of the ISPS Code, and was fully implemented on July 1, 2004. It requires vessels and port facilities to

conduct vulnerability assessments and develop security plans that may include passenger, vehicle and baggage screening procedures; security patrols; establishing restricted areas; personnel identification procedures; access control measures; and installation of surveillance equipment.

By creating a U.S. port security program that is consistent with the international community, we are better able to identify and prevent threats. The MTSA security initiatives were developed with three primary areas of concern (awareness, prevention and response), while focusing on maritime industries that have a potential for higher risk of involvement in a transportation security incident. MTSA also required the establishment committees in all of the nation's ports to coordinate the activities of all port stakeholders, including other federal, local and state agencies, industry and the boating public. These groups, called Area Maritime Security Committees, are tasked with collaborating on plans to secure their ports so that the resources of an area can be best used to deter, prevent and respond to terror threats. Below, you will find numerous operational maritime security strategies that both the U.S. and International maritime communities have implemented or are in the process of implementing.

Implementing Strategy[2]

In U.S. Waters and On U.S. Shores

National Targeting Center (NTC)—(Prevention & Response) The priority mission of Department of Homeland Security (DHS), Customs and Border Protection (CBP) NTC is to provide tactical targeting and analytical research support for CBP anti-terrorism efforts. Experts in passenger and cargo targeting at the NTC operate around the clock using tools like the Automated Targeting System (ATS) to identify tactical targets and support intra-departmental and inter-agency anti-terrorist operations. The NTC also supports operations in the field including the Container Security Initiative (CSI) personnel stationed at critical foreign ports throughout the world.

Maritime Intelligence Fusion Centers—(Prevention) Located in Norfolk, Va., and Alameda, Ca., these units compile and synthesize intelligence products from the federal, state and local level dealing with maritime security. These intelligence products are then disseminated to homeland security professionals across the country responsible for securing our ports and waterways.

High Interest Vessels Boarding—(Prevention) Before they are allowed to enter port, all vessels are screened for the security risk they pose to the United States based on information about the vessel's cargo, size, voyage, security history and any intelligence information. Those identified as higher risk are targeted for offshore boarding to ensure potential security issues are addressed prior to entry into port. In addition, the Coast Guard randomly selects vessels for security boarding to ensure an element of unpredictability and thus deterrence. Specially trained Coast Guard teams board the boats through traditional water based methods or by fast roping from helicopters.

Operation Port Shield—(Prevention) Operation Port Shield focuses on the implementation and enforcement of the new security measures implemented under the ISPS international requirements or MTSA between June 15 and July 1, 2005. Under this verification program, the Coast Guard will be boarding every vessel, at sea or at the dock, on its first visit to a U.S. port on or after July 1 to ensure that the vessel is complaint with U.S. security standards. These program officers will also visit foreign countries to evaluate antiterrorism measures in place at ports abroad.

Automatic Identification System (AIS)—(Awareness) AIS is a type of vessel-tracking equipment that automatically sends detailed ship information to other ships and shore-based agencies, allowing for comprehensive, virtually instantaneous vessel tracking and monitoring, increasing security and safety in our shipping channels. Currently, most vessels required to use this technology are large vessels on international voyages. The Coast Guard is exploring possible ways to expand these requirements to other vessels and other U.S. waters.

Area Maritime Security Committees—(Awareness, Prevention & Response) The Coast Guard has established committees in all the nation's ports to coordinate the activities of all port stakeholders, including other federal, local and state agencies, industry and the boating public. These groups are tasked with collaborating on plans to secure their ports, so the resources of an area can be best used to deter, prevent and respond to terror threats.

Port Security Assessment Program—(Awareness) This program is aimed at increasing the information and best practices available to port officials across the country to help them make decisions about how to reduce the vulnerability of their ports. The Coast Guard is in the process of closely examining the key infrastructure in the nation's 55 most economically and strategically important ports for potential vulnerabilities.

Port Security Grants—(Awareness, Prevention & Response) The Port Security Grant Program provides federal resources for projects to enhance facility and operational security for critical national seaports. Funds assist ports in analyzing vulnerabilities and then closing gaps in security through physical enhancements like access control gates, fencing, lighting and advanced communication and surveillance systems. The program also funds the implementation of security strategies to prevent and respond to terror threats. Over the past three years, $516 million in grants have been allocated and another $50 million are currently pending review.

Non-Intrusive Inspection Technology (NII)—(Prevention) Non-Intrusive Inspection (NII) technology allows U.S. Customs and Border Protection to screen a larger portion of the stream of commercial traffic in less time while facilitating legitimate trade. CBP officers use large-scale gamma ray and x-ray imaging systems to safely and efficiently screen conveyances for contraband, including weapons of mass destruction. These units can scan the interior of a full-size 40-foot container in under a minute. Inspectors also use personal radiation detectors to scan for signs of radioactive materials, as well as special high-tech tools such as density meters and fiber-optic scopes to peer inside suspicious containers. Finally, if necessary, containers are opened and unloaded for a more intensive manual inspection.

Maritime Safety and Security Teams (MSSTs)—(Prevention & Response) A MSST is a Coast Guard rapid response force assigned to a vital port and capable of nationwide deployment by air, ground or sea transportation to meet emerging threats. MSST's were created in direct response to the terrorist attacks on Sept. 11, 2001. They have unique capabilities, including explosive-detection dogs, personnel trained to conduct fast-roping deployments from a helicopter to a hostile vessel, and anti-terrorism/force protection small boat handling training. Eight teams are currently in operation and five more are scheduled to be commissioned by early 2005.

Guarding In-Between the Ports—(Prevention) Coast Guard, CBP Border Patrol, and Immigration and Customs Enforcement's Air and Marine Operations units are responsible for patrolling and securing our nation's borders between the ports of entry. During FY04, DHS personnel have apprehended more than 770,000 illegal aliens on land and over 9,000 at sea. By adding additional personnel, equipment and technology, the Department of Homeland Security has been able to broaden the areas of coverage. Through strong enforcement operations and the state of the art technology at the borders, the department has enhanced its operational effectiveness on the frontline.

Operation Drydock—(Awareness & Prevention) This Coast Guard and FBI investigation into national security threats and document fraud associated with U.S. merchant mariner credentials revealed nine individuals linked to terrorist groups that held maritime credentials. Merchant mariner credentials are often used as an identification document that allows mariners to come and go from the ship while it is docked in a foreign port. This investigation, enhancements to the criminal background check process for applicants, and increased security features on the cards themselves, have increased the U.S. Government's ability to monitor crews of the U.S. merchant fleet.

Transportation Workers Identity Card (TWIC)—(Awareness & Prevention) The goal of the TWIC program is to develop a secure uniform credential to prevent potential terrorist threats from entering sensitive areas of our transportation system. When implemented, the TWIC program will ensure that credentials contain a biometric identifier to positively authenticate identities of TWIC holders. By having one universally recognized credential, workers avoid paying for redundant cards and background investigations to enter secure areas at multiple facilities. The Prototype Phase will be conducted at 35 facilities in six states, including the ports of Los Angeles and Long Beach, California, and the fourteen major port facilities in the state of Florida. The prototype is funded with $50 million included in Homeland Security's Transportation Security Administration (TSA) budget and up to 200,000 port workers are expected to participate.

America's Waterways Watch—(Awareness) The goal of America's Waterway Watch is to help prevent acts of terrorism and other illegal activity that jeopardize maritime homeland security by having members of the maritime and recreational boating industries, as well as the boating public, recognize and report to appropriate authorities suspicious activity that may be an indicator of potential terrorism. Any observations of suspicious or unusual activity could be extremely valuable to our national security and may provide clues to help uncover patterns of possible terrorist activity. Reports can be made to the Coast Guard, local law enforcement, or by calling 1-877-24-WATCH.

Global Security Initiatives

Overseas In Port

24-Hour Advanced Manifest Rule—(Awareness) All sea carriers with the exception of bulk carriers and approved break bulk cargo carriers, are required to provide proper cargo descriptions and valid consignee addresses 24 hours before cargo is loaded at the foreign port for shipment to the United States through the Sea Automated Manifest System. Failure to meet the 24-hour Advanced Manifest Rule results in a "do not load" message and other penalties. Through this program, administered by CBP, the department has greater awareness of what is being loaded onto ships bound for the United States and the advance information enables DHS to evaluate the terrorist risk from sea containers.

Container Security Initiative (CSI)—(Awareness & Prevention) Under the CSI program, the screening of containers that pose a risk for terrorism is accomplished by teams of CBP officials deployed to work in concert with their host nation counterparts. Nineteen of the top twenty ports have agreed to join CSI and are at various stages of implementation. These twenty ports account for approximately 66 percent of sea containers shipped to the United States.

Customs-Trade Partnership Against Terrorism (C-TPAT)—(Awareness & Prevention) Through C-TPAT, thousands of importers, carriers, brokers, forwarders, ports and terminals, and foreign manufacturers have taken the necessary steps to secure their supply chains. Under the C-TPAT initiative, business participants providing verifiable security information are eligible for special benefits. The security enhancements put in place by C-TPAT participant allow DHS to devote more resources to high-risk shipments.

International Ship and Port Facility Security (ISPS) Code—Awareness & Prevention) By July 1, 2004, countries around the world will have implemented the first multilateral ship and port security standard ever created. The ISPS Code requires vessels and port facilities to conduct security assessments, develop security plans and hire security officers. By establishing a standard for security, the world has increased its ability to prevent maritime related attacks by making ports around the world more aware of unusual or suspicious activity.

International Port Security Program—(Awareness & Prevention) Under this effort, the U.S. Coast Guard and the host nations will work jointly to evaluate overall national compliance with the ISPS Code. The Coast Guard will use the information gained from these visits to improve the United States' own security practices and to determine if additional security precautions will be required for vessels arriving in the United States from other countries.

Operation Safe Commerce (OSC)—(Awareness & Prevention) This pilot program analyzes security in the commercial supply chain and tests solutions to close security gaps. The technologies tested in the program will enhance maritime cargo security, protect the global supply chain, and facilitate the flow of commerce. DHS has awarded $58 million in grants to the private sector since its inception and will award another $17 million to private companies.

In Transit

Smart Box Initiative—(Prevention) One core element of CSI is using smarter, "tamper evident" containers that will better secure containerized shipping. Designed to be "tamper evident," the Smart Box couples an internationally approved mechanical seal affixed to an alternate location on the container door with an electronic container security device designed to deter and detect tampering of the container door. If someone attempts to open the cargo door after it has been sealed, the Smart Box device on the door would reflect that there had been an attempted intrusion into the container. Together with the results of technology testing, Operation Safe Commerce, DHS will have valuable information to assist in developing performance standards for container security.

Ship Security Alert System (SSAS)—(Response) Like a silent alarm in a bank, a SSAS allows a vessel operator to send a covert alert to shore for incidents involving acts of violence, (such as piracy or terrorism), indicating that the security of the ship is threatened or has been compromised. The International Ship and Port Facility Security Code required new passenger and cargo ships of at least 500 gross tons to install this equipment by July 1, 2004. Existing passenger vessels and cargo vessels must have the equipment installed prior to the first radio survey after July 1, 2004, or by July 1, 2006. Other types of vessels may carry and use SSAS voluntarily.

Automated Targeting System (ATS)—(Awareness) CBP's ATS serves as the premier tool for performing transactional risk assessments and evaluating potential national security risks posed by cargo and passengers arriving by sea, air, truck, and rail. Using pre-arrival information and input from the intelligence community, this rules-based system identifies high-risk targets before they arrive in the United States.

96-Hour Advance Notice of Arrival—(Awareness & Prevention) Ships must notify the Coast Guard 96 hours before arriving in a U.S. port and provide detailed information on the crew, passenger, cargo and voyage history. This information is analyzed using databases and intelligence information, including reviewing previous security problems with the vessel or illegal activity on the part of the crew. Part of this analysis will also account for the security environment in previous ports of call. By obtaining this information well in advance of a vessels arrival, the U.S. Coast Guard is able to make determinations about which vessels require additional attention, including security precautions such as an at-sea boarding or armed escort during transit to and from port.

The Proliferation Security Initiative—(Prevention) This initiative seeks to stop the flow of weapons of mass destruction (WMD), in part by boarding suspect vessels and seizing WMD-related cargoes, as exercised here in October 2004 by naval forces from Japan, Australia, France, and the United States.

Conclusion

Protecting our seaports and waterways is such an enormous and vital task. It is easy to see and understand the relationship between our seaports and the global transportation infrastructure. Knowing what we now know about our enemies and their capabilities, failure by any nation to implement and execute a sound maritime security plan can be only labeled as a national suicide waiting to happen. I want take this time to credit and thank both the United States Coast Guard[3] and the International Maritime Organization[4] for the work they have done in the area of developing policy and assisting the maritime community in the implementation of the new maritime security initiatives. There is one last maritime security resource that I have not yet written of, and that is you. The people working and living around the seaports and waterway play a very important part in the overall security implementation plan. If you see suspicious activity report it immediately to your local port security or law enforcement office.

References

1 Coast Guard Port Security Initiatives Post 9/11/2001, DHS April 7, 2004 Presentation

2 Secure Seas, Open Ports, Keeping our waters safe, secure and open for business Department of Homeland Security, June 21, 2004

3 United Stated Coast Guard Internet Website: http://www.uscg.mil/

4 International Maritime Organization Website: http://www.imo.org/home.asp

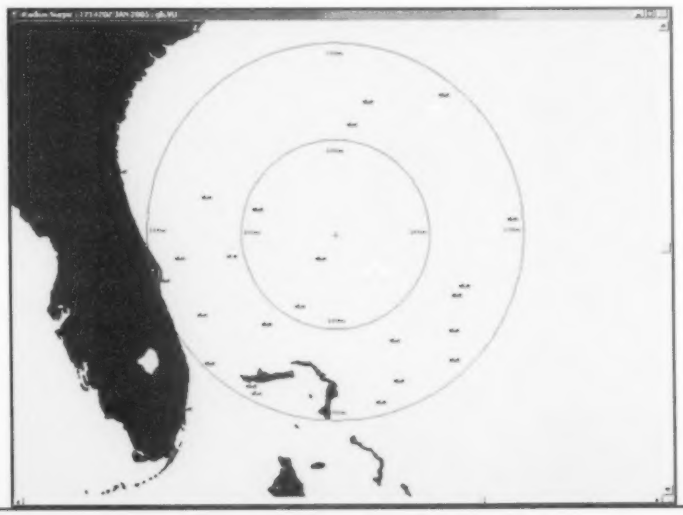
Amver–SURPIC II Improvements

By Gary A Burke, Jr., Amver Applications Programmer II, USCG Operations System Center

Hello again. I hope you enjoyed last issue's article on the Amver system. In this article I would like to share the recent improvements made to Amver's SURPIC II application. If you're not familiar with Amver's SURPIC II application, allow me to give you a quick overview.

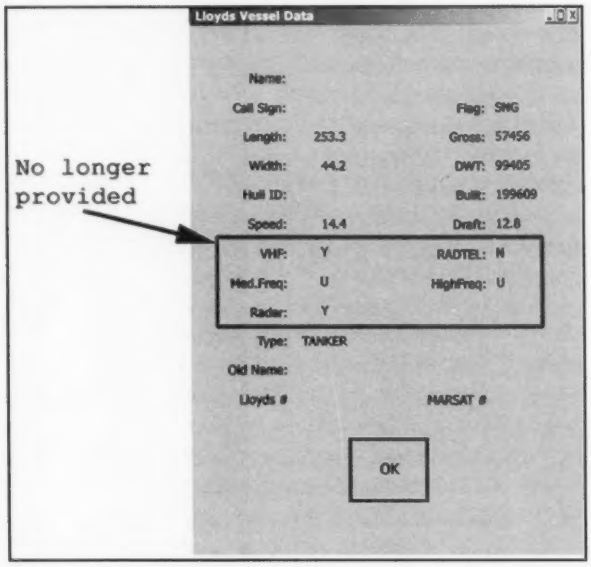
To begin, SURPIC is short for Surface Picture. SURPIC II is the application the Coast Guard Rescue Coordination Centers (RCCs) use to determine the best Amver asset to utilize in the event of a distress at sea. The SURPIC II application accesses the Amver database and dead reckons all the vessels within the distress area using the last know good position in Amver. The information is then displayed for the operator at the RCC via the Amver Vessel Summary dialog box. Vessels are listed by call sign, name, predicted position, hours to intercept, distance to intercept, course variance, flag of registry, SAR(Q) medical, reported medical and satellite number. This information can be sorted by call sign, name, hours to intercept, distance to intercept, flag of registry, reported medical and satellite.

The SURPIC application also allows the RCC operator to research Amver, Lloyds and owner information for a selected vessel. RCC operators can review a vessel's dimensions, medical capabilities and owner contact information within seconds. Operators can review report and vessel voyage information for a selected vessel. All this information is there to assist the operator in utilizing the best search and rescue (SAR) resource available. In addition to this information, operators are able to "plot" the SURPIC information. This gives the RCC's a visual representation of the Amver Vessel Summary dialog box. Visualization of the SAR scenario can assist the operator in making a more accurate decision when selecting the best asset to utilize. Below is what the RCCs would see when they "plot" the data. For this example, the call sign tag that accompanies each vessel icon has been removed, to keep the propriety of the information intact. The cross hairs represent the actual distress position. Operators have the ability to select any vessel from this display and research its vessel information with a simple click of the mouse.



Requests for SURPIC's from RCC's outside the United States are processed by the nearest Coast Guard RCC, and then forwarded by the most expeditious means (telephone, fax, telex, e-mail) to assist in that nation's response to an emergency within its area of responsibility under international agreements. The SURPIC II application is only distributed to U.S. Coast Guard RCCs to ensure Amver data is used only for SAR purposes.

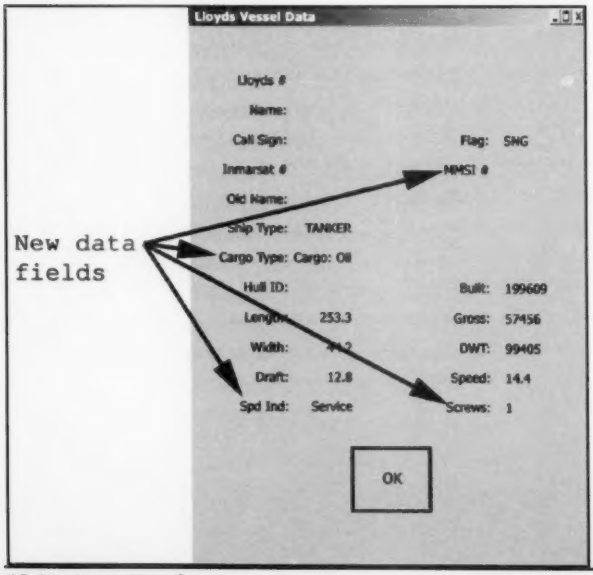
The genesis behind the SURPIC improvements was the need to fully utilize the new information available through Amver's Lloyd's Register – Fairplay data feed. With the new data feed, some information SURPIC used would no longer be provided by Lloyd's. This allowed Amver to refine the SURPIC II application, incorporating new information and reconfiguring some of the dialog boxes to be more user friendly. Minor changes were made to the Vessel Summary and Amver Data dialog boxes. The Vessel Summary dialog was configured to allow 3-digit country codes, and the WX column was removed. The WX column had not been utilized for some time, as new processes had replaced this method of ship identification. The Amver Data dialog box was reconfigured, providing the same information in a more concise format.

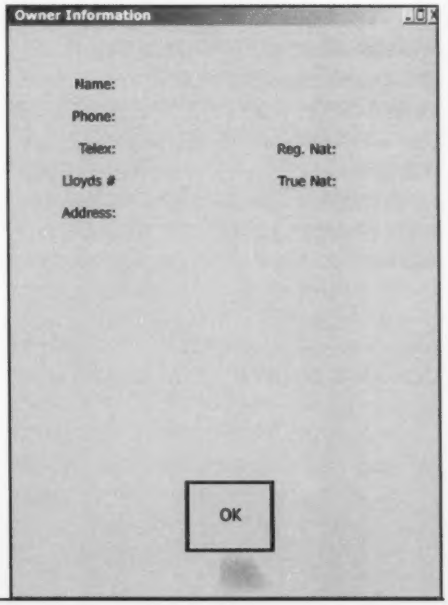


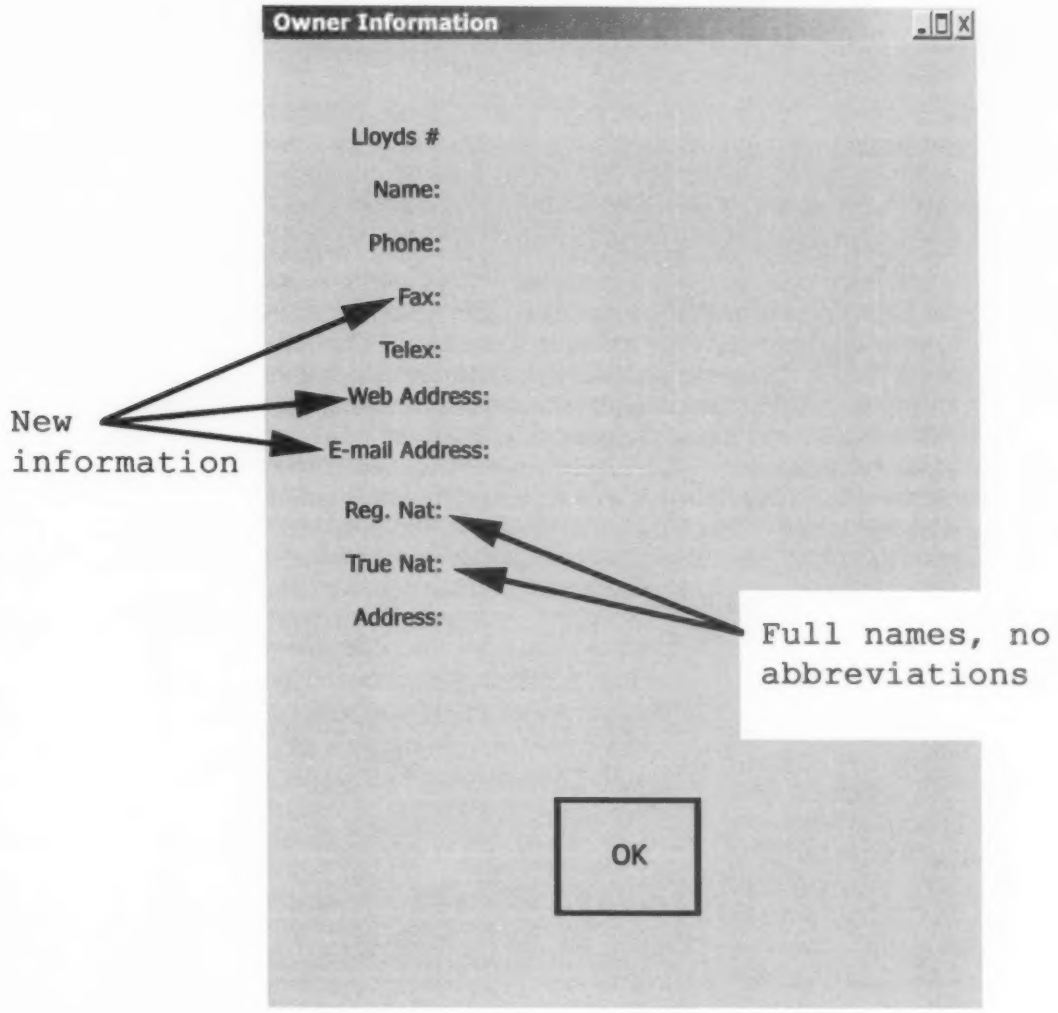
The more robust changes are seen in the Lloyds Vessel Data and Owner Data dialogs. In the old Lloyds Vessel Data dialog, information was spread out, and five data fields were no longer going to be provided. This dialog is shown aboce with the data fields that are no longer being provided highlighted. Please note that, on all of the following dialog boxes, sensitive vessel information was removed.

The new Lloyds Vessel Data dialog will take the new information along with the current information and provide it in a concise easy to read format. The new dialog box is shown on the bottom left.

The changes to the Owner Information dialog boxes are similar in nature to the Lloyds Vessel Data changes, except that all information is still being provided as before in addition to the new data fields. On the bottom right is what the old Owner Information dialog looked like.







Here is how the new Owner Information dialog appears.

So if you happen to be a user of the SURPIC II application, we hope you find this new information beneficial and easy to use. If you're not a user of SURPIC, but perhaps an Amver participant, be assured the Amver Team is constantly working to keep the information in Amver accurate and as close to real time as possible. We know you're counting on us. And if you're not an Amver participant, I ask you to please take a few minutes to visit our web site at www.amver.com and learn more about us. I think you'll find that Amver is something unique and worthy of consideration.

Shipwreck: *Veslefjell* Sailed on the Lakes and Oceans

by Skip Gilham, Vineland, Ontario, Canada

The Norwegian firm of Olsen and Ugelstad dates back to 1915, when they began trading with the wooden sailing ship **Superb**. The company continued to expand gradually, adding steel steamers. Their initial service was in and around Norway, but despite the Depression, they began coming to the Great Lakes in 1932.

Their early transatlantic freighters had been designed for the North Sea coal trade or for work on the Baltic, and they were not really equipped for service to North America. Two new ships for this trade were completed in 1935 and three more in 1936. The firm became commonly known as the "Fjell Line" due to the names of their ships ending in "fjell"..

The company pioneered liner trading to the Great Lakes but their success was interrupted by World War Two. It resumed in 1948, and they continued to add package freight carriers designed to accommodate the small locks of the pre-Seaway system.

Among the new postwar carriers was the **Veslefjell**. The 258 foot, 7 in long by 42 ft, 7 in wide freighter was built at Frediksstad, Norway, in 1951, and was soon travelling to the inland seas. During the winter months the ship delivered their Canadian cargoes to Saint John, New Brunswick, and Halifax, Nova Scotia.

The opening of the St. Lawrence Seaway on April 25, 1959, allowed ships up to 730 feet long by 75 feet wide to enter the Great Lakes, so freighters like **Veslefjell** became less competitive. The owners sent this ship to John Crown & Sons at Sunderland, England, in May 1960, and it was lengthened to 287 feet, 4 inches. This increased the carrying capacity from 2,745 to 3,355 tons deadweight.

Beginning in 1959, **Veslefjell** made eleven trips to the Great Lakes, and these voyages continued until the ship was sold in May, 1962. Renamed **Sea Carrier**, it operated under British registry but reverted to Olsen & Ugelstad in May, 1964, and reacquired the former name. It was resold to Greek interests in June, 1965, and became **Asteri** for Seaways Co. Inc. It was again sold to Titramar, Inc. in 1969, and they applied the name of **Marlen**. A final sale in 1975 took the ship to Baru Shipping Co. (Panama) SA., although registry remained at Piraeus, Greece.

Marlen's final cargo proved to be a load of cement that came aboard at Aegion in January, 1978, for Nigeria. The ship encountered heavy seas in an Atlantic storm shortly after passing Gibraltar and the stress on the 27-year old hull eventually led to the development of leaks. On January 21, the pumps could no longer compete and the vessel was abandoned by the crew in position 29.47 N / 11.49 W. The ship was last seen, low in the water, northeast of the Canary Islands, at 30.01 N / 11.37 W and was presumed to have sunk.

Photo: Skyfotos

In Real-Time—How VOS Observations and PMOs Can Make a Difference!

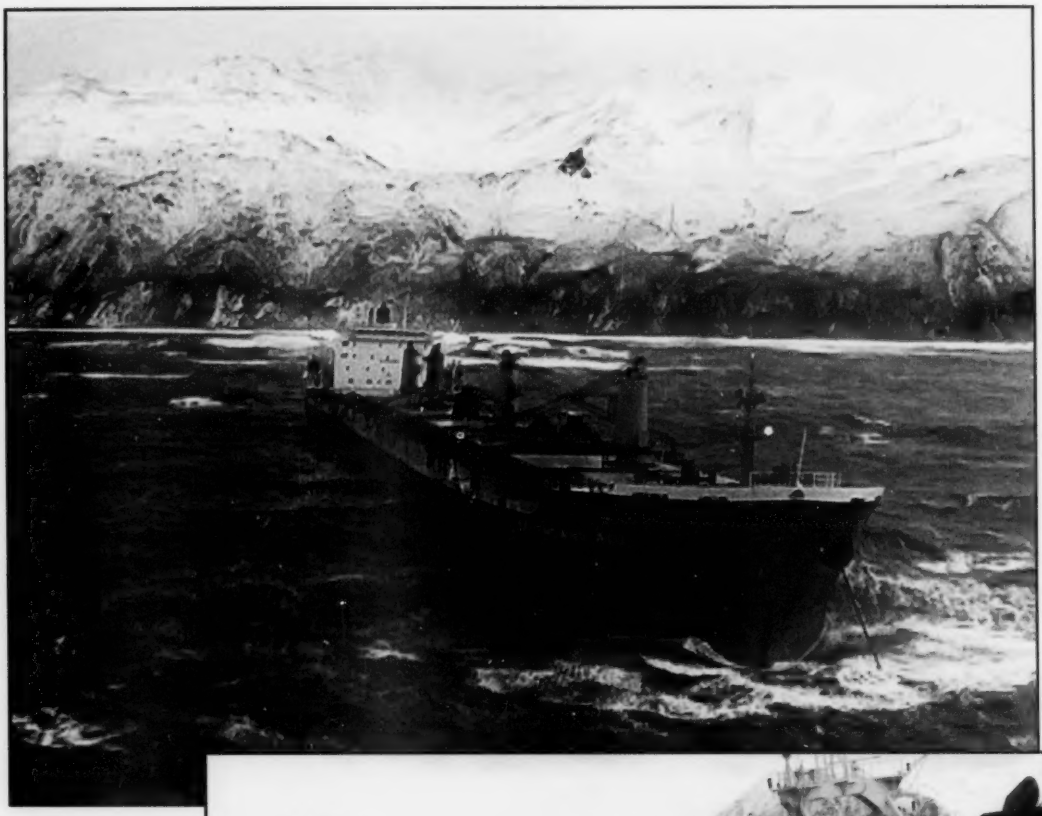
Jim Jones, Chief: Data Acquisition Branch, NOAA's National Weather Service Alaska Region, Anchorage, AK
Photos courtesy of US Coast Guard Unified Command.

On December 6, 2004, the 738-foot, Malaysian-flagged freighter, **M/V Selendang Ayu**, experienced engine trouble in the Bering Sea near Unalaska Island in the eastern Aleutians during a raging winter storm. On December 8th, while an attempt was made to tow the ship offshore, the tow rope broke and the **Selendang Ayu's** anchor was unable to hold. The vessel went aground near Skan Bay, a remote isolated area west of Dutch Harbor, Alaska.

The following is a summary of the actions taken to develop weather support for the initial rescue efforts, and its evolution into support for a longer-term hazmat cleanup and salvage operation. VOS ship observations were critical in helping forecasters, search and rescue, and hazmat responders evaluate atmospheric and oceanic conditions in this data sparse section of Alaska. VOS participants and Port Meteorological Officers (PMO's), through their cooperative efforts, were vital in support of this incident response.

During the afternoon of December 8th, shortly before the grounding, NOAA's HAZMAT Coordinator contacted NOAA's Weather Forecast Office (WFO) in Anchorage and requested a weather briefing on observed and forecast conditions affecting the north side of Unalaska Island. The only observations immediately available to forecasters were from Dutch Harbor, approximately 30 miles to the east, which are not always representative of the conditions in or near Skan Bay. The Foss Maritime Tug **Sidney Foss**, a Seattle-based VOS participant, who had attempted to take the **Selendang Ayu** in tow, had provided several observations from the area prior to and for a few days after the grounding. Another call from NOAA's HAZMAT about an hour after the first call indicated that the ship had in fact run aground and they were now requesting twice daily weather briefings and access to all available observations until further notice. In addition, NOAA's Alaska Aviation Weather Unit (AAWU) worked in conjunction with the WFO to provide combined marine and aviation forecast packages to support the U. S. Coast Guard (USCG) and Federal Aviation Administration (FAA), who were involved in early Search and Rescue operations.

Between the first two calls from NOAA HAZMAT, Anchorage forecasters received a 0000Z ship report from the **M/V Arctic Sun** (ELQB8), one of Alaska Region's top reporting VOS participants. The **Arctic Sun** was situated about 120 nmi west-northwest of Skan Bay, and provided forecasters with their first indications of true sea heights and verified that both wind and sea forecasts were right on target.

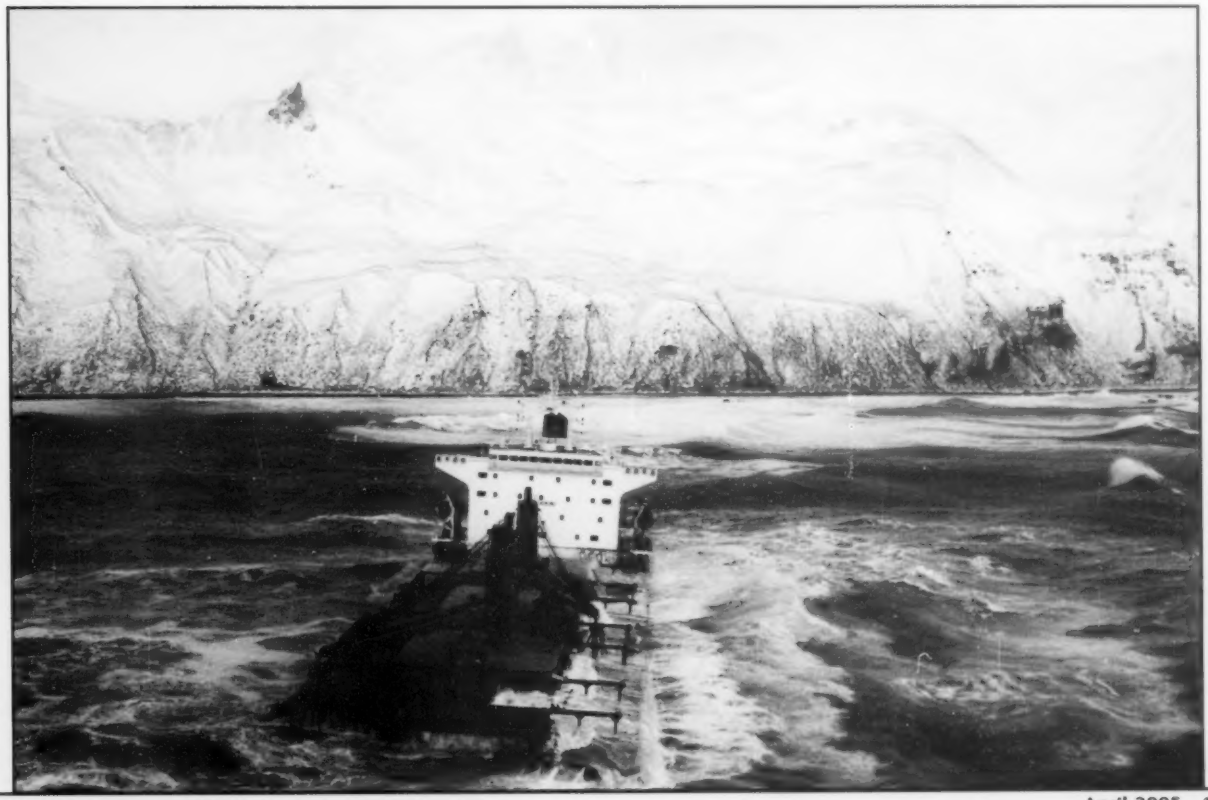


Within the next two hours, another VOS participant, the **M/V Solar Wing** (ELSJ7), provided additional data from within 150 nmi of the incident site and again helped validate the existing marine forecast. During one of the early weather briefings with the USCG, requests were made for observations to be provided from the USCG Cutter at the incident site. Three and six hourly observations were provided by the **CGC Alex Haley**, and later by the **CGC Sherman**. Their observations were relayed to the USCG Communications Station at Kodiak, who passed the data to NOAA's Weather Service Office (WSO) in Kodiak, who encoded and transmitted the data. This data flow continued for about a week following the grounding until the USCG Cutters were relieved from providing assistance and security in the area by the cleanup and salvage vessels.

In the days immediately following the grounding of the **Selendang Ayu**, other forecast and observational support activity was taking place. By the end of the first week, the NWS had deployed an Incident Meteorologist (IMET) to Dutch Harbor to provide direct forecast support to the Unified Command overseeing the cleanup and salvage effort. In addition, the NWS installed an automated weather station on a bluff north of the incident site to provide hourly observations.

From the time this incident first came to light, and especially during the first couple of weeks, PMO's Rich Courtney (Kodiak) and Larry Hubble (Anchorage) helped coordinate VOS data collection efforts. They identified which vessels would be in the area and the easiest means by which to communicate with those vessels. Due to the remoteness of the incident site, it was hard to count on one specific communications method to work continuously. HF/SSB, satellite phone, cell phone, and VHF all have their limitations in that particular area of the Aleutians.

In particular, Rich was able to contact the parent company of the salvage tug **Redeemer**, Magone Marine (based in Dutch Harbor) and was able to recruit the two into the VOS program. They provided twice daily observations from the incident site while on-station. Larry followed-up Rich's efforts by shipping a barometer to the tug, then he remotely worked with the **Redeemer** crew to calibrate the

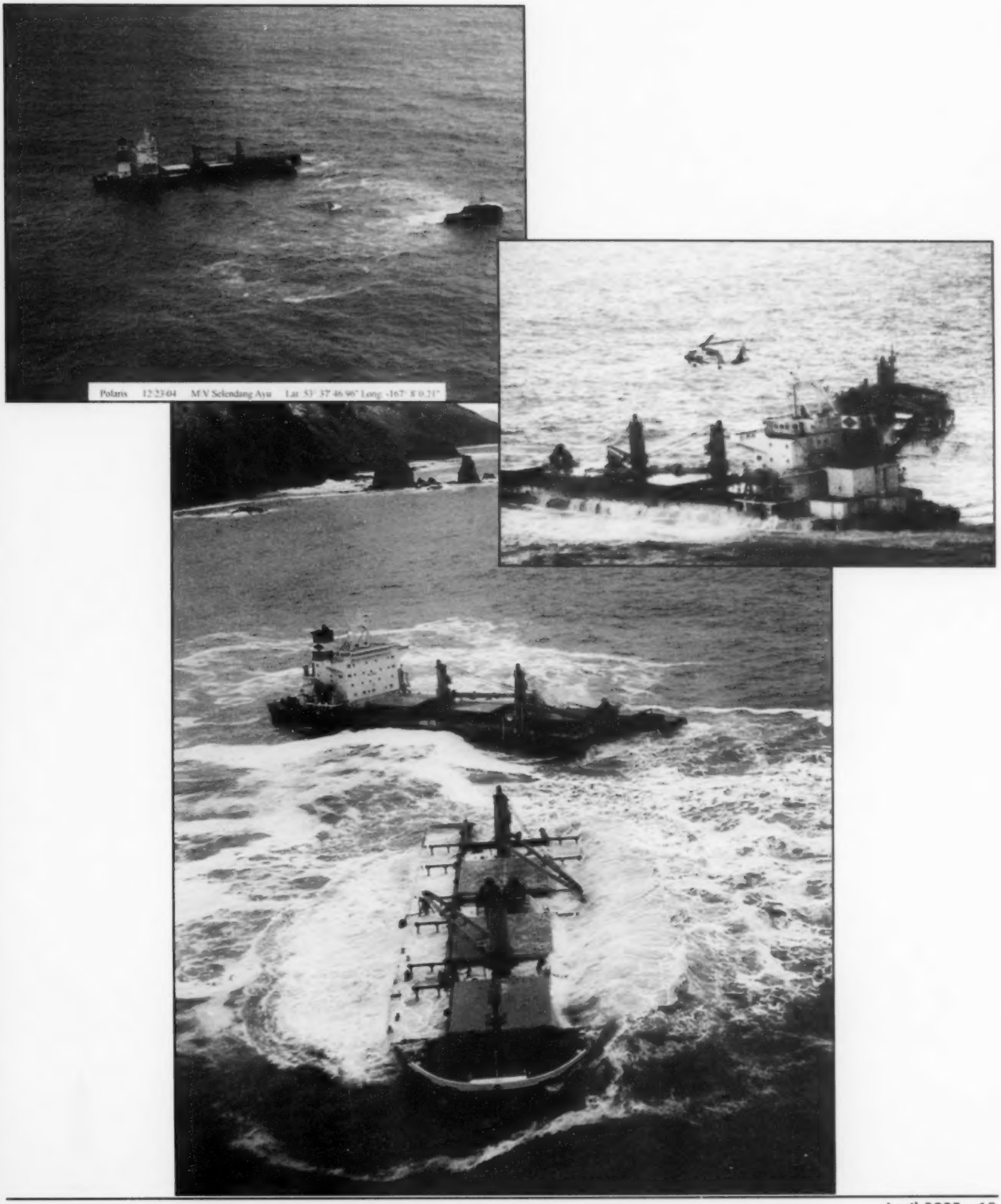


barometer and provide them observational training. Additional data was provided by the VOS ship **R/V Tiglax**, who was part of the salvage and cleanup effort—critical on-site wind and sea data continued.

Another way in which these two PMO's helped IMET's and operational forecasters in Anchorage was to share known metadata and data quality characteristics about the various VOS and MAREP vessels in the area, which comes from an effective near real-time quality control program, which both PMO's utilize in their daily routines. Their knowledge of the ships providing observations in and around the area helped bolster the forecasters confidence levels in the quality of the data being used to make critical decisions.

A quote from Eddie Zingone, Marine Focal Point, WFO Anchorage: "From the perspective of a forecaster writing a hazmat forecast, or any marine or near-shore forecast for that matter, the ship reports received from vessels participating in the VOS program are gold! There is no better way to both write a quick and accurate forecast, and to verify the existing forecast than with these observations."

There may be a tendency to view the VOS program from the "big picture"—as mainly used in support of large scale surface analysis through six hourly synoptic observations, and to provide valuable climate data over the data sparse oceans. In addition, there is a similar generic view of Port Meteorological Officers as non-operational staff who support these functions. This article was written in the hopes of highlighting the value of close proximity (~150 nmi) VOS observations in support of dynamic and evolving near-shore operational forecasts, and how PMOs can become an integral part of an operational scenario by providing liaison with various marine interests and help in coordinating marine data collection and data quality control.

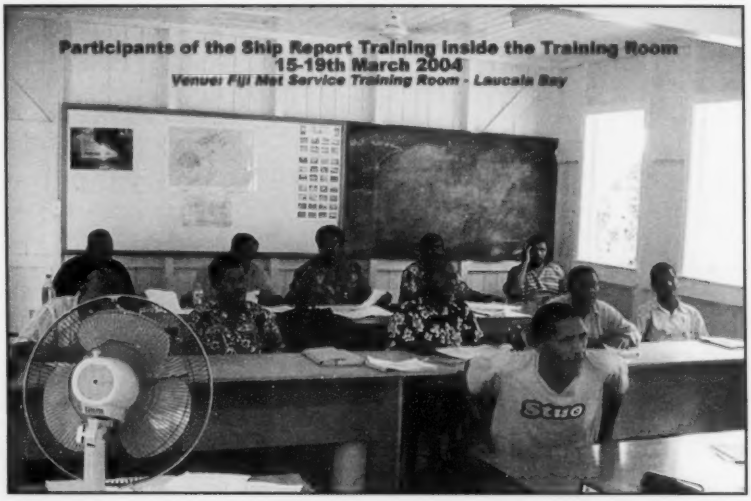

Polaris 12/23/04 M/V Selendang Ayu Lat: 53° 37' 46.96" Long: -167° 8' 0.71"

Marine Observation (Ships Report Code) Training

Tan Singh, Training Officer, Fiji Meteorological Service

Introduction

The course was the first of its kind to be conducted in Fiji. It was conducted at the Laucala Bay Weather Office from 15th to 19th March 2004 in response to a request made by the Government Shipping Services (GSS) of the Ministry of Transport and Civil Aviation of the Republic Of Fiji Islands. There were 12 participants who were all seamen from within the Government Shipping Services.



Objectives

The training was focused on developing the knowledge of the participants on the symbolic form of the International Code of the ships report and its importance to the Fiji Meteorological Service (FMS).

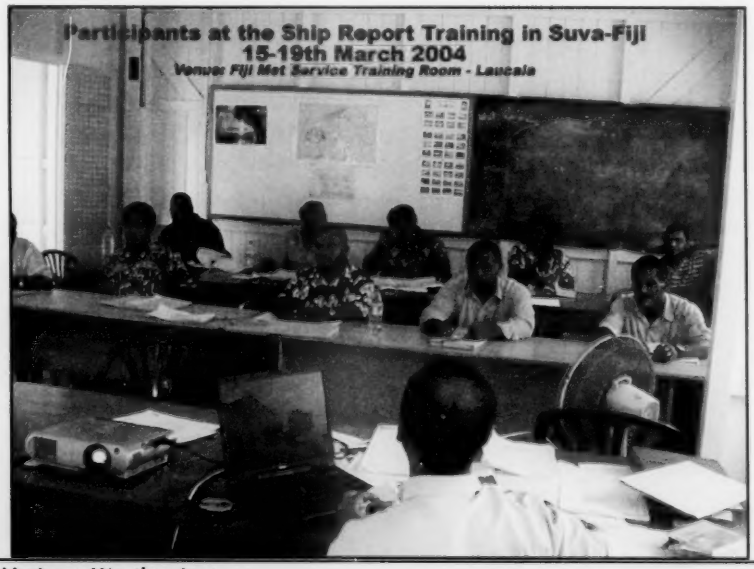
It also aimed at up-skilling the participants on the operation of the meteorological instruments, the construction of the actual reports, and their transmission to the National Weather Forecasting Centre in Nadi, Fiji Islands.

Methodology and Strategies

The four-day course was divided into theoretical and practical sessions. The strategy adopted was power-point presentations that focused on the symbolic form of the ship report and the various types of weather elements that make up the report.

Practical sessions were also very much part of the training as the participants were exposed to the use of the standard observational instruments that are routinely used by the Meteorological Service for hourly reports and synoptic purposes. Identification of instrument faults and basic maintenance procedures were also taught.

There were also discussions held on the methods of transmitting the reports to the National Weather Forecasting Centre of the Fiji Meteorological Service during which it was suggested that the reports are communicated directly to Forecasting Centre through radio telephone



Outcomes

The training presented an opportunity for the participants to understand the need to provide more and complete ship reports from within the Fiji waters. The need to broaden the network of ships reporting was also noted.

The training also gave the participants an opportunity to understand the importance of providing accurate and timely reports and to appreciate FMS utilization of the reports for forecasting purposes.

The successful completion of the training has provided credit to their careers.

Evaluation

Overall, the training was very successful in identifying the needs of FMS and GSS in terms of preparing ships reports. It was well organized and structured, but given its complexity and importance it was felt that it should be allocated more time in future training. Although the venue was thought to be the best for similar training in future, the classroom condition and furniture were considered below standard.

Recommendations

- Installation of weather observational instruments on the government ships to proceed as soon as possible. This will allow trained personnel to do proper reports.
- Future training on the same topic to be extended to two weeks so that the syllabus can be thoroughly covered.
- Participation in future training to be extended to other seamen in Fiji who have not gone through the same training.
- The training room at Laucala Bay to be provided with the following: air-conditioning, white board, proper desks and chairs, curtains, and the room to be connected to the FMS local area network.

Special thanks to Robert A. Luke of NOAA Mariners Weather Log for providing assistance in sending to the Fiji Islands, The International Ship Report Codes, Cloud Charts, Video Tape on Ship Reports, and Beaufort Scale in electronic format. These materials were very useful during the course.

Waves of Power—Tsunami

Jim Luciani, National Weather Service, Port Meteorological Officer New York/New Jersey,

The spoken word "Tsunami" whose immense power was widely known within the marine community prior to Dec 26, 2004, will get a different reaction from everyone now that this infamous day is part of history.

That day will be remembered for one of the most destructive and deadly natural catastrophes known to modern man. Over 150,000 dead (only the Bangladesh Typhoon of 1970 (500,000) and China Earthquake of 1976 (240,000) killed a larger number), more than 500,000 injured, billions of dollars in damage! How could a phenomena of this power strike with no warning? Is it possible that a ship at sea let these huge waves pass by unnoticed? Unfortunately for those ashore, it is unlikely that a ship at sea could have noticed this killer. The waves were deep in the ocean and nearly imperceptible from the surface. It is only when the waves begin to interact with the shallow waters of the coastlines that they take their destructive shape as a series of "giant waves."

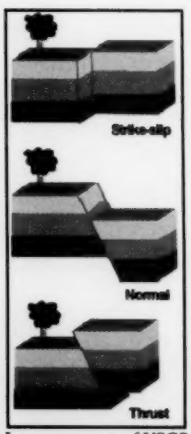


Image courtesy of USGS

Scientists know that it was a powerful earthquake along the sea floor that spawned the waves. It measured 9.2 on the Richter scale, releasing energy equivalent to 475,000 kilotons (475 megatons) of TNT, or the energy of 23,000 Hiroshima bombs. One side of the fault along which the earthquake developed slipped beneath the other, thrusting one of the plates rapidly upward (seismologists speculate a 50 foot slip in a matter of seconds) while pushing the water above it upward, creating a series of waves along the ocean floor.

These waves, with heights usually less than a foot, can have wavelengths of nearly 60 miles, have periods of 10 minutes to 1 hour, and travel at speeds in excess of 500 mph. It is the long wavelengths that enable it to move with such speed and to retain nearly all of its power as it approaches shore. Once the waves begin to feel the bottom, they begin to rise to terrifying heights. The only warning visible to those ashore may be a pronounced and very unusual withdrawal of water in the shallows, as if the waves were gathering themselves for a violent rush onshore.

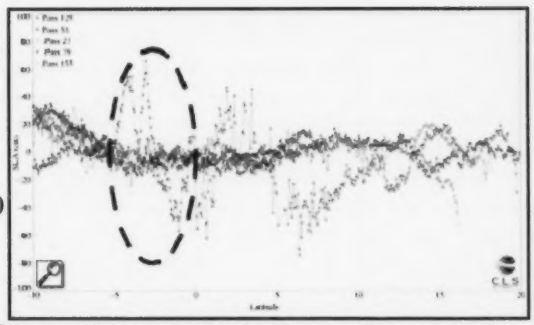


Image displays the Sea level anomalies measured by the Jason-1 altimetry satellite in red at the time of the tsunami (the other curves show measurements made at other times, for comparison). The area corresponding to the first wave are circled. The left scale is cm, the bottom degrees latitude.

Image courtesy of Aviso, CEA and CLS

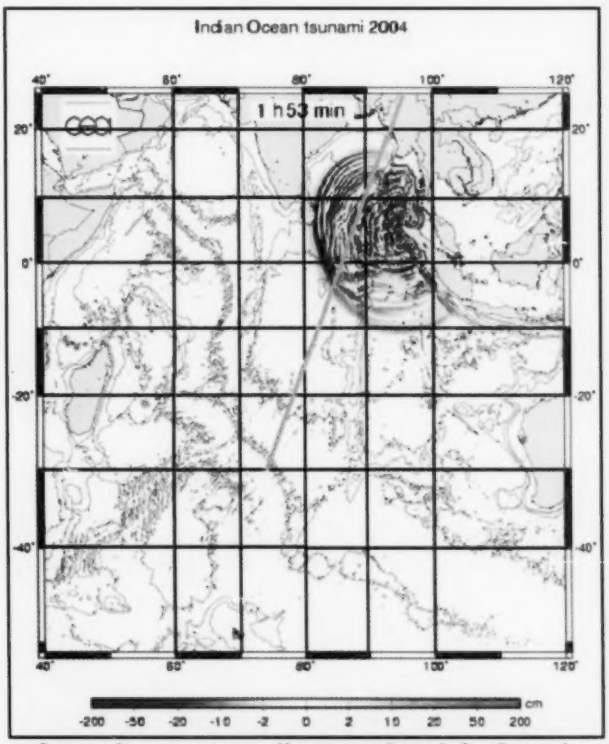
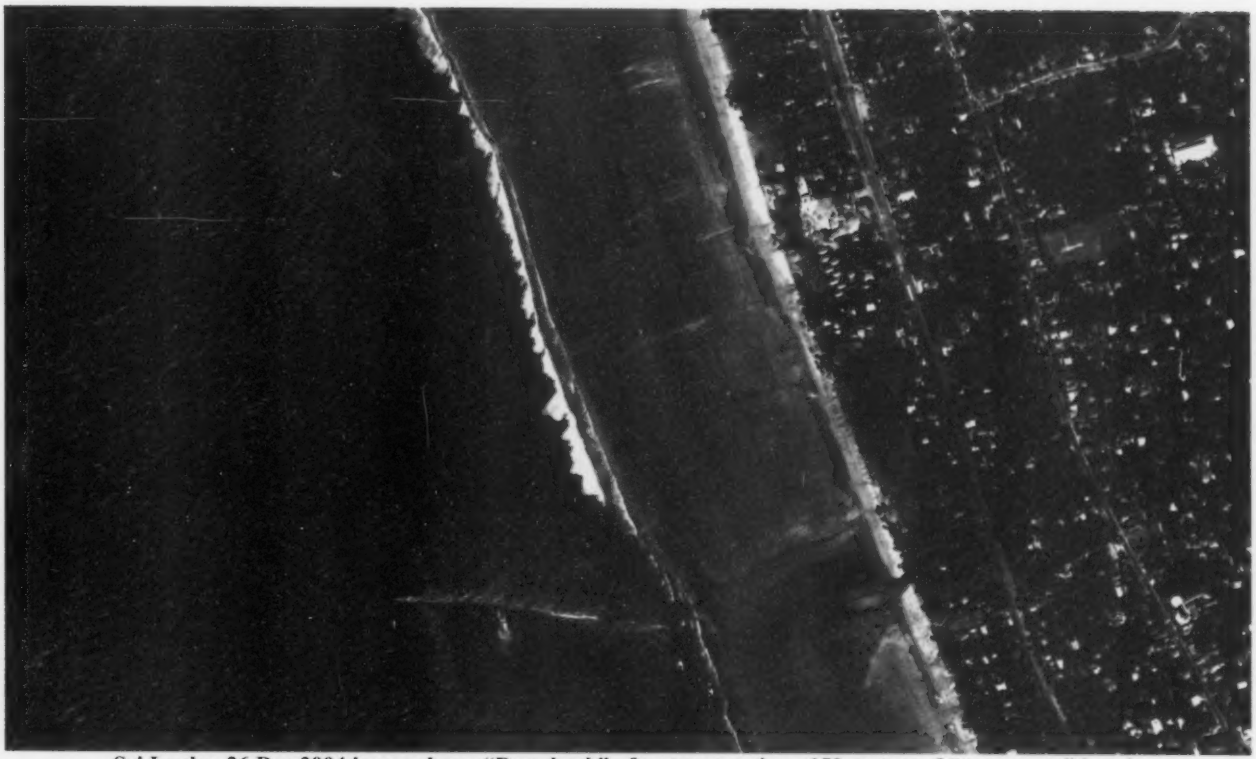


Image shows corresponding ground track for Jason-1.

Image courtesy of Aviso, CEA and CLS



Sri Lanka, 26 Dec 2004 image shows "Drawback" of water exposing ~150 meters of "temporary" beach.
Photo courtesy of Digitalglobe.com

What should ships do if they receive word that a tsunami is approaching? According to NOAA, UNESCO/ Intergovernmental Oceanographic Commission (IOC) and the International Tsunami Information Center (ITIC):

- Since tsunami wave activity is imperceptible in the open ocean, do not return to port if you are at sea and a tsunami warning has been issued for your area. Tsunamis can cause rapid changes in water level and unpredictable dangerous currents in harbors and ports.
- If there is time to move your boat or ship from port to deep water (after you know a tsunami warning has been issued), you should weigh the following considerations:
  - Most large harbors and ports are under the control of a harbor authority and/or a vessel traffic system. These authorities direct operations during periods of increased readiness (should a tsunami be expected), including the forced movement of vessels if deemed necessary. Should a forced movement of vessels be directed, keep in contact with the authorities.
  - Smaller ports may not be under the control of a harbor authority. If you are aware there is a tsunami warning and you have time to move your vessel to deep water, then you may want to do so in an orderly manner, in consideration of other vessels. Owners of small boats may find it safest to leave their boat at the pier and physically move to higher ground, particularly in the event of a locally-generated tsunami. Concurrent severe weather conditions (rough seas outside of the harbor) could present a greater hazardous situation to small boats, so physically moving yourself to higher ground may be the only option.
  - Damaging wave activity and unpredictable currents can affect harbors for a period of time following the initial tsunami impact on the coast. Contact the harbor authority before returning to port making sure to verify that conditions in the harbor are safe for navigation and berthing.

Phillipe Lijour aboard the tanker Esso. Languedoc captured this image in 1980 when the ship was struck by a rogue. The mast visible on the starboard side is 25 m above sea level.

Image courtesy of www.thephora.org

The tsunami is not the only large wave that threatens ships. "Rogue waves" are a far more ominous threat to ships at sea than is a tsunami. These freaks of nature have claimed a number of large commercial ships as victims of its powerful force. For years the mariner has reported encounters with waves upwards of 100 ft, particularly off the southeastern coast of Africa. Scientists were often skeptical that these rogue waves truly existed, but the improvement in wind and wave observing from satellites has finally proved what the mariner knew to be true all along. Now with the help of Scatterometry a group of scientists are attempting to find these waves, document the conditions that helped create them, and develop a tool to forecast their occurrences.

What have scientists discovered about the causes of these monster waves? A team of German oceanographers were able to create similar waves in a tank. Their theory about the waves cause is that slow moving waves are caught by larger, longer period waves (the longer the period the faster the wave) moving nearly twice their speed. The waves pile on top of each other creating a huge set of waves that are forced to collapse on themselves (with an immense release of power).

Another theory that was debated revolved around the fact that so many of these events occurred in the vicinity of strong ocean currents, specifically the Agulhas and Gulf Stream currents. When strong winds generated large waves that flowed into the current the currents acted as a barrier, forcing the waves to slow and rise to steep heights. The "North Wall Effect" is a well known and documented example of this effect.

It is likely that both of these factors come into play for the largest of these waves. Armed with this knowledge, a wise mariner can anticipate when the danger of rogue waves is most likely along their particular route. Unfortunately there is no technique to employ to sail out of danger (like there is with a hurricane), no advanced warning (yet!) that one or more of these are headed in your direction (like there is with a Tsunami). It is the Master, crew and ship in a pitched battle against nature, and hopefully nature loses more and more in the future. Engineers and Scientists armed with the information from the German oceanographers are already busy designing ships that can better withstand the power of these waves. The battle with nature is slowly, but gradually beginning to turn in our favor!

In the Wake of a Destructive Typhoon: Cold Water, Low Tides, and Fog

Sarah A. Prior, Meteorologist, National Oceanic and Atmospheric Administration (NOAA), and Charles 'Chip' Guard, Warning Coordination Meteorologist, National Oceanic and Atmospheric Administration (NOAA)

Cold up-welled water and dense fog are formidable companions to mariners setting sail off the coast of California, Peru and the Cape of Good Hope. Most mariners would agree that these companions are happily forgotten when boating in more tropical parts of the ocean. However, mariners beware! Under certain conditions, cold up-welled water, fog and lower than normal tides can be found in tropical regions. A case in point occurred in the days following April 9, 2004, when the island of Yap of the Federated States of Micronesia in the western North Pacific was struck by Typhoon Sudal. The devastation left in Sudal's wake came as no surprise, but the cold ocean temperatures, low tides and fog were most unexpected.

Yap Island rarely gets a direct hit from a typhoon. In fact, before Sudal, it had been some 50 years since a typhoon hit the island. Many local islanders attribute this good fortune to magic. Typhoon Sudal developed early in the year in Chuuk State, and as it intensified on a west-northwest track, it appeared that it would move midway between Guam and Yap. However, south of Guam, Sudal began to move toward the west, and eventually southwest toward Yap.

On the morning of April 9, Sudal began to lash the island with typhoon force winds. The center of the eye of

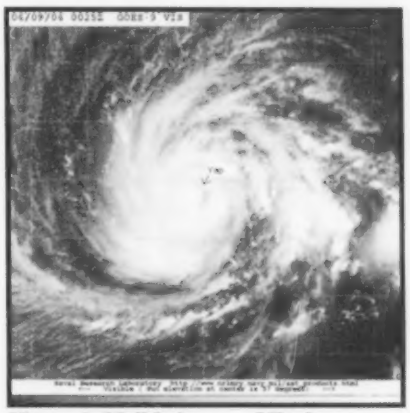


Figure 1. Visible image of Typhoon Sudal on 9 April 2004 at 0025 UTC (1025 Yap local time) as the eye passed across the extreme southern tip of the island.

the typhoon passed about 15 nmi south of the island around noon (***Figure 1***). The peak wind recorded was observed at the International Airport in the early afternoon—a gust of 97 kts. The lowest observed pressure was 958.5 hPa, also at the airport. The strongest winds hit the extreme south end of the island, which also experienced a brief eye passage and an 11-foot storm surge. Local weather people and emergency managers had the 15,000 residents prepared for the typhoon. As a result, there was not a single death or serious injury. Devastation was widespread, amounting to around 14 million dollars. The capital city of Colonia and Yap's harbor experienced storm surges of 8 and 9 feet, respectively. ***Figure 2*** shows the heavy coastal erosion at the entrance to the port. Tropical Storm and Typhoon winds in tropical regions of the Pacific are categorized according to the Saffir-Simpson Tropical Cyclone Scale (Guard and Lander, 1999), which relates maximum tropical cyclone wind speed to potential damage and storm surge. Despite being only 9 nmi from north to south, the island experienced Typhoon Category 1 winds (1-minute sustained winds of 64–82 kts) on the north side, Typhoon Category 2 winds (1-minute sustained winds of 83–95 kts) in the central region, and Typhoon Category 3 winds (1-minute sustained winds of 96–113 kts) on the extreme south end.

Figure 2. Ariel picture of Yap harbor and the capital city of Colonia after the passage of Typhoon Sudal. The storm surge on the extreme south end of the island was about 11 ft, and here at the harbor it was about 9 ft.

After passing Yap, Sudal took a northwest track, and a day later, had sustained winds of 135 kts. While the typhoon itself was of great interest, the remainder of the story concentrates on what occurred on and near Yap after its passage—low tides, cold water, and fog.

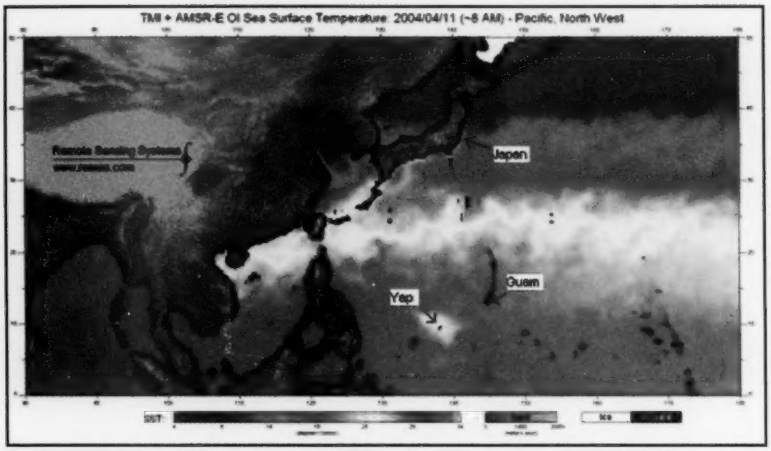


Figure 3. SST composite from satellite microwave sensors TMI (onboard TRMM) and AMSR-E generated two days after Typhoon Sudal made eye passage on the southern tip of Yap.

It is well-known that tropical cyclones induce a sea surface temperature (SST) cold wake preferably to the right of the tropical cyclone track (Price, 1981). SST's measured in the wake of Hurricane Gilbert in 1988 in the Atlantic basin decreased about 4°C in the storm's wake located to the right of the track (Jacob and Shay 1999). SST's derived from the Tropical Rainfall Measurement Mission (TRMM) satellite showed a patch of 3°C SST cold wake in the western Pacific after the passage of Typhoon Rusa (Huang, Wu and I-Lin, 2002). During Hurricane Isodore's passage over the Yucatan Shelf, strong upwelling caused 4°C cooling (Zhao and Chen, 2002).

The SST composite in ***Figure 3***, generated two days after Sudal's passage on Yap, shows a cold wake of 6°C, similar in magnitude to previous studies. In ***Figure 3***, the cold wake near Yap has a SST around 24°C, whereas the waters in the rest of the equatorial western Pacific are closer to 30°C. Before Sudal's passage, waters around Yap were also near 30°C.

The cold up-welled water, which occurred in Sudal's wake, had an interesting effect on the Yap's weather. The Weather Service Office on Yap reported fog for several hours in the weather observations. In addition, residents of Yap reported seeing fog, feeling much cooler ocean waters, and observing significantly lower tides.

Shay, Chang and Elsberry (1990) modeled the ocean response to Hurricane Fredric and found that the sea level depression in the wake of Fredric was around 20 cm along the storm track. They demonstrated that the sea surface depression was induced by the hurricane's wind stress and the surface Ekman divergence (Shay and Chang 1996). Western Pacific sea level anomalies generated from University of Hawaii's Sea Level Center show the April 2004 sea level anomaly for Yap to be -23 cm in (***Figure 4***). This monthly anomaly was significantly greater than those of the surrounding islands and of similar magnitude to model results of Shay *et al.*

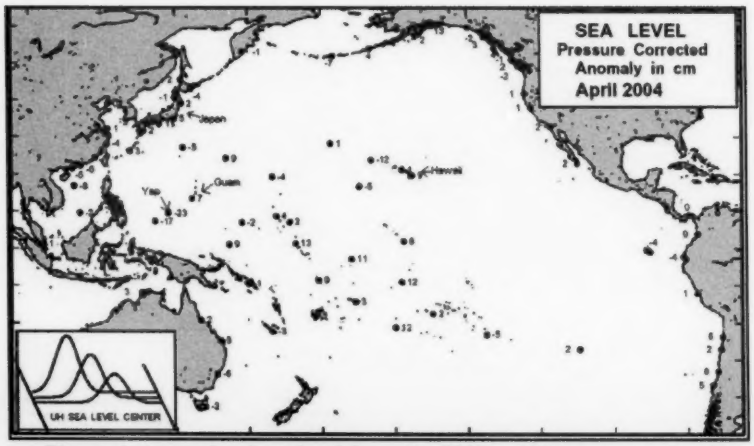


Figure 4. Anomaly of sea level from the 1993 to 2001 mean sea level adjusted for atmospheric pressure.

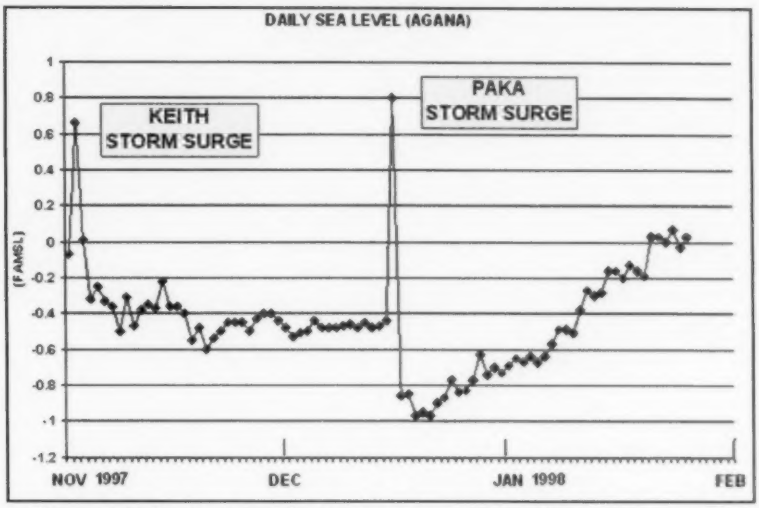


Figure 5. Daily Sea Level for Agana, Guam in feet above mean sea level during and after Super Typhoon Keith and Super Typhoon Paka.

Similar negative anomalies in the wake of tropical cyclones have been observed on Guam. After Super Typhoon Keith (1996), Super Typhoon Paka (1997) and Super Typhoon Pongsona (2002), there were dramatic drops in the sea level and tides after the initial storm surge subsided (***Figure 5***).

With a tidal range not much greater than 3 ft in the Mariana Islands of the western North Pacific, a 1-ft depression in tides is quite obvious to local residents. Local surfers on Guam were so surprised by the 1-ft depression in tides that they thought the reef was moved by Typhoon Pongsona.

When threatened by a hurricane or typhoon, seamen take great pains to avoid the gale-force and stronger winds. They often wait until the storm has passed and then follow in the wake of the storm, well behind the winds. However, the up-welled area of colder water in the wake of the storm may produce some dense fog, and mariners should be aware of what could be waiting just beyond the horizon.

It is interesting to note that recent studies modeling the cold wake and sea level depression have compared well to observations from islands of the western Pacific experiencing tropical cyclone passage. It will be difficult to forecast fog based on these findings, but mariners should be on the lookout for such occurrences! And, don't depend on tide tables under these conditions, or you may find your boat high and dry!

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Hurricane Force Extratropical Cyclones Observed Using QuikSCAT Near Real Time Winds

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HURRICANE FORCE (HF) winds (64 kts or greater) and the associated seas are a significant threat to safety at sea. These extreme cyclones are capable of producing loss of life and large loss of property. In 1998, losses of over 100 million dollars were reported when the containership **APL China** encountered HF conditions in the north Pacific from an extratropical cyclone that began as Typhoon Babs. HF cyclones can also impact coastal areas. A HF cyclone struck the southeast coast of England in October, 1987, and has since been referred to as the Great Storm. In December of 1999, a pair of HF cyclones (Lothar and Martin) hit northern France causing widespread tree damage and power outages. Although HF conditions are often thought to most frequently occur in tropical cyclones, forecasters and researchers at the National Oceanic and Atmospheric Administration (NOAA) Ocean Prediction Center (OPC) in Camp Springs, MD have been studying HF wind events associated with extratropical or mid-latitude storm systems using near-surface winds from the National Aeronautics and Space Administration (NASA) QuikSCAT scatterometer[1]. OPC forecasters routinely use QuikSCAT winds along with ship and buoy observations to determine wind warning categories of GALE (34 to 47 kts), STORM (48 to 63 kts), and HURRICANE FORCE (64 kts or greater). These warning categories are displayed on North Atlantic and North Pacific surface analyses that are broadcast via United States Coast Guard (USCG) Radiofacsimile and are also available via the Internet at http://www.opc.ncep.noaa.gov/. This article gives a brief summary of what the NOAA Ocean Prediction Center has learned about HF extratropical cyclones.

From October 2001 to April 2004 OPC forecasters observed a total of 120 HF cyclones (***Table 1***) in both the North Atlantic and North Pacific oceans (between 15 to 23 HF events each year per ocean). Cyclones were considered to be HF intensity if winds of 64 kts or greater were observed at any point in their life cycle by QuikSCAT, a ship of opportunity or a buoy. Only a handful of these cyclones began as tropical cyclones—the vast majority originated in the mid-latitudes. The

Period of Study	Atlantic	Pacific
2001–2002	22	15
2002–2003	23	22
2003–2004	15	22

Table 1. The number of Hurricane Force Extratropical Cyclones detected using QuikSCAT from October to April of 2001 to 2004.

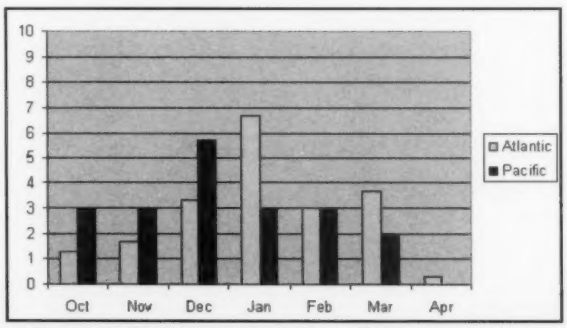

Figure 1. The average number of HF extratropical cyclones by month for the period October through April from 2001 through 2004. Atlantic is shown in light gray, Pacific in dark gray.

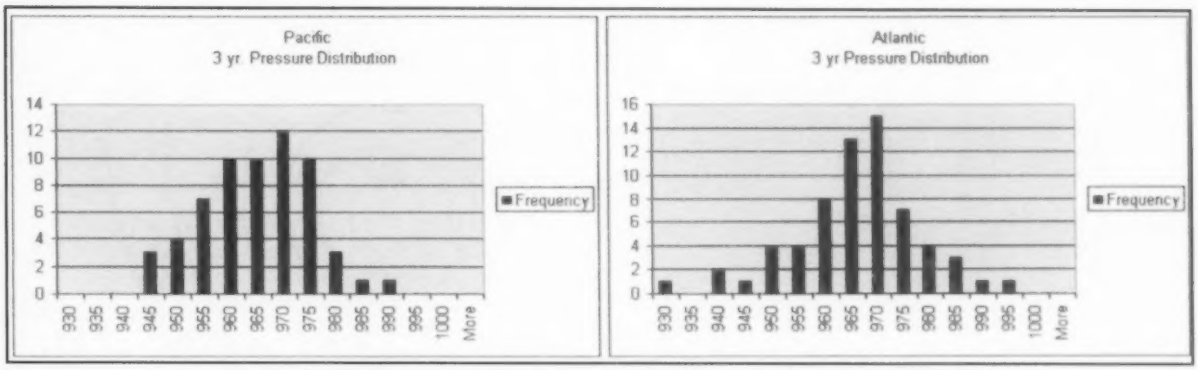

Figure 2. Frequency of HF storms versus minimum central pressure (hPa) for the Pacific (a) and Atlantic (b) from October to April of 2001 to 2004.

monthly distribution of HF cyclone occurrences is shown in ***Figure 1***. HF cyclones were observed in all months from October through April in both oceans with the highest frequency in the North Pacific in December and in the North Atlantic in January. ***Figure 2*** shows the central pressure distribution of cyclones at HF intensity. The average central pressure at HF was between 965 and 970 hPa for both oceans. The distribution of pressure was found to be wider in the Atlantic (930 to 995 hPa) than in the Pacific (945 to 990 hPa). We observed that the Atlantic produced deeper HF cyclones (pressure wise) than the Pacific. We surmise that this is due to the higher baroclinicity (stronger temperature gradients) of the Atlantic compared to the Pacific. We also found that the Atlantic can produce weaker (pressure wise) HF storms than the Pacific. These are assumed to be due to the orographic influences of Greenland.

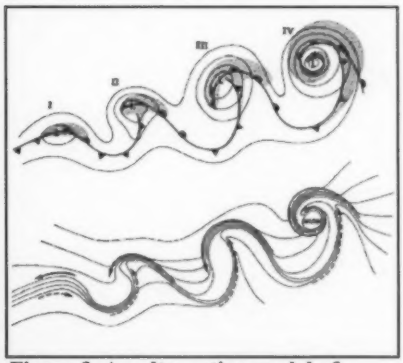

Figure 3. An alternative model of frontal-cyclone evolution (Shapiro and Keyser, 1990): incipient broad-baroclinic phase (I), frontal fracture (II), bent back front and frontal T-bone (III), and warm core frontal seclusion (IV). Upper: sea level pressure (solid), fronts (bold), Figure and cloud signature (shaded). Lower: temperature (solid), and cold and warm air currents (solid and dashed arrows). (Adapted from Neiman and Shapiro, (3))

For most cyclones, HF conditions were observed to occur at or near the time of minimum central pressure (the mature phase of the cyclone). We have found that HF conditions on average last less than 24 hours. This is relatively short-lived compared to the average life span of 5 days for ocean storms. Unfortunately this makes forecasting the timing of these extreme events difficult.

In tropical cyclones, HF winds tend to be found close to the center on the periphery of the eye wall. Where are HF conditions observed in mid-latitude cyclones? To answer this question, lets first take a look at the life cycle of a typical ocean storm. ***Figure 3*** shows the evolution of an ocean storm as depicted by Shapiro and Keyser[2] (1990). The cyclone begins as an open frontal wave with a warm front and cold front (I). As the cyclone intensifies, the frontal wave begins to amplify. The cold front pushes eastward (south of the low) and the temperature gradient tightens to the west of the low center (II). The front associated with this tightening temperature gradient west of the low is referred to as the bent back front or occluded front. The wave continues to amplify (III) as the bent back (occluded) front and associated temperature gradient swings eastward to the southwest of the low center. The strongest temperature gradient in phase III is associated with the continuous warm to bent back front and not in association with the cold front to the south.

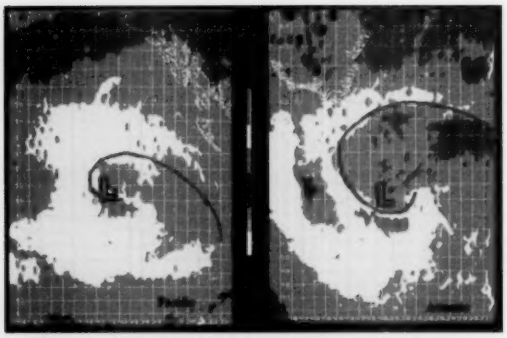

Figure 4. Composite of maximum winds observed by QuikSCAT for open ocean HF cyclones for the months of October- April for the three year period from 2001–2003 in (a) the North Pacific (11 cyclones) and (b) the North Atlantic (6 cyclones). Wind speed (kts) is shown in solid contours (color bar in center of figure.) In both (a) and (b) the area of HURRICANE FORCE winds is a red crescent shaped area to the south of the low center.

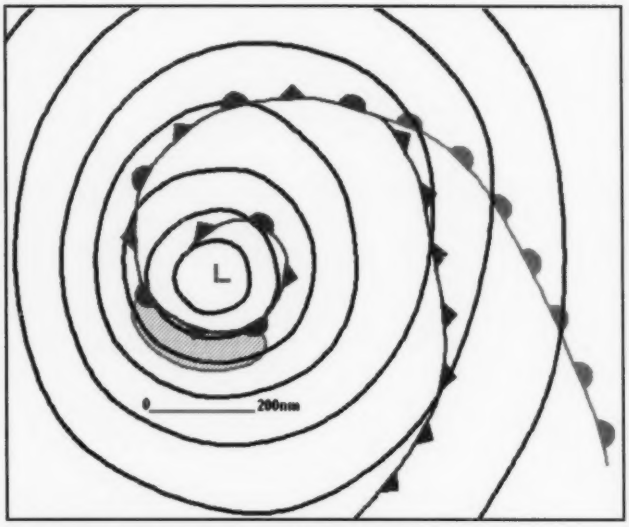

Figure 5. Mature phase of the Shapiro-Keyser cyclone model. The red shaded area to the south of the Low center is the area of HF winds from *Figure 4.*

Phase III is referred to as the frontal T-bone. Phase IV shows the mature cyclone or warm core frontal seclusion. At this point the very strong temperature gradient (or front) has encircled the surface low center. A shallow pocket of relatively warm air has migrated to the low center and become cut off or secluded (thus the term warm seclusion). Within the warm seclusion the air is very unstable and convection may occur. An arc of very strong temperature gradient surrounds this pocket of warmer air with cold air found to the exterior of this temperature gradient. A very strong pressure gradient exists on the cold side of the temperature gradient (south of the low). It is in this area of strong pressure gradient that HF conditions are often observed.

To determine where HF conditions occur most frequently relative to the center of the mature cyclone,

Figure 6. QuikSCAT pass from 1600 UTC 01 December 2004. Wind speed in kts (color bar in upper right). The HF winds are depicted as red wind barbs. Note the location is to the south of the Low center.

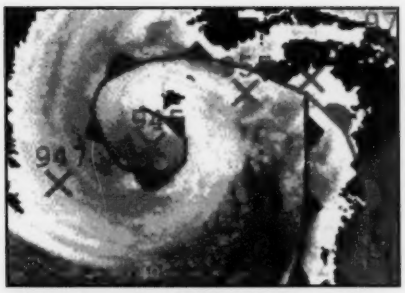

Figure 7. GOES 8 IR satellite image from 1800 UTC 26 October 1998 overlaid with the surface frontal analysis showing HF extratropical cyclone. Six hourly position (red X) and central pressure in hPa are shown.

QuikSCAT winds were used to create composites of the maximum winds for 17 open ocean HF cyclones (11 in the North Pacific and 6 in the North Atlantic). These composites are shown in ***Figure 4***. All cyclones used in these composites were near maturity or close to minimum central pressure. The Green shading depicts GALE FORCE winds, Yellow—STORM FORCE, and Red—HURRICANE FORCE. The occluded fronts are drawn in purple. Both composites show large crescent-shaped areas of HF winds to the south of the composite cyclone center. The Atlantic composite shows the band of extreme winds from 120 to 180 nmi from the center of the cyclone. The Pacific composite is slightly different with HF winds from approximately 60 to 150 nmi from the center of the cyclone composite. Is this the only location to expect HF winds? No! The cyclones used for these composites were chosen carefully to eliminate any possible land influence. QuikSCAT winds have also revealed HF conditions to the northeast of low centers in advance of (or north of) the accompanying occluded front and near mountainous coasts such as Greenland, Alaska, and the Kamchatka Peninsula.

Figure 5 is a conceptual model that shows the sea-level pressure, fronts, and area of HF winds of the mature phase of an ocean cyclone. The red-hatched area extending from southeast to nearly west of the low center illustrates where QuikSCAT frequently observes HF winds. ***Figure*** 5 illustrates where to anticipate HF winds in a mature cyclone. The QuikSCAT image from a mature North Atlantic cyclone from December 1, 2004 (***Figure 6***) reinforces this point. Note the large area of HF winds (RED wind barbs) to the south of the low center in agreement with the conceptual model in ***Figure 5***.

HF cyclones can indeed be very dangerous. A satellite image from October 26, 1998 from the North Pacific near the International Dateline is shown in ***Figure 7***. The 6-hourly central pressures of this intense low from the OPC surface analyses are shown as red numbers (hPa). The low center locations are indicated by red-X's. This cyclone reached maturity with an impressive depth of 945 hPa. The occluded front and cloud head nearly encircled the low center similar to the mature cyclone (IV) shown by Shapiro and Keyser (***Figure 3***) and the conceptual model displayed in ***Figure 5***. From ***Figure 5*** one would anticipate that HF conditions would have been observed in a narrow band south of the low center and the occluded front. Indeed, that was where HF conditions were experienced by the container ship **APL China**. The **APL China** suffered one of the single largest losses of containers within hours of this image.

To summarize:

- HURRICANE FORCE winds do occur with mid-latitude winter storms
- The season extends from October through March for both the North Atlantic and Pacific
- HF cyclones occur most frequently in:
  - December in the North Pacific
  - January in the North Atlantic
- HURRICANE FORCE winds generally occur south of the low center on the cold side of the occluded front.

By continuing to study these extreme cyclones we hope to improve forecasts and provide mariners with adequate lead-time to avoid the dangerous conditions that occur during these events.

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Atlantic Hurricane Season of 2004

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Introduction

The 2004 Atlantic hurricane season was among the most devastating on record. The year's storms claimed over 3,100 lives, the second largest toll in three decades; 61 of these occurred in the United States. The United States suffered a record $44 billion in property damage from five hurricane landfalls (Charley, Frances, Gaston, Ivan, and Jeanne), and the eyewall crossing of a sixth (Alex). In addition, Bonnie, Hermine, and Matthew made landfall in the United States as tropical storms. Florida was battered by Charley, Frances, Ivan and Jeanne. Several islands of the Caribbean were also hard hit by Charley, Ivan, and Jeanne, particularly Grenada, Jamaica, Grand Cayman, Cuba, and Hispaniola. Additionally, the Bahamas were hit hard by Frances and Jeanne.

Fifteen named storms developed in 2004, including Nicole, a subtropical storm. Nine became hurricanes and six became major hurricanes. One additional tropical depression did not reach storm strength. These totals are considerably above the long-term (1944–2003) means of 10.2 named storms, 6.0 hurricanes, and 2.6 major hurricanes. August alone saw the formation of eight tropical storms, a new record for that month. The season also featured several intense and long-lived hurricanes. Ivan, a category 5 storm on the Saffir-Simpson hurricane scale, reached a minimum pressure of 910 hPa, a value surpassed by only

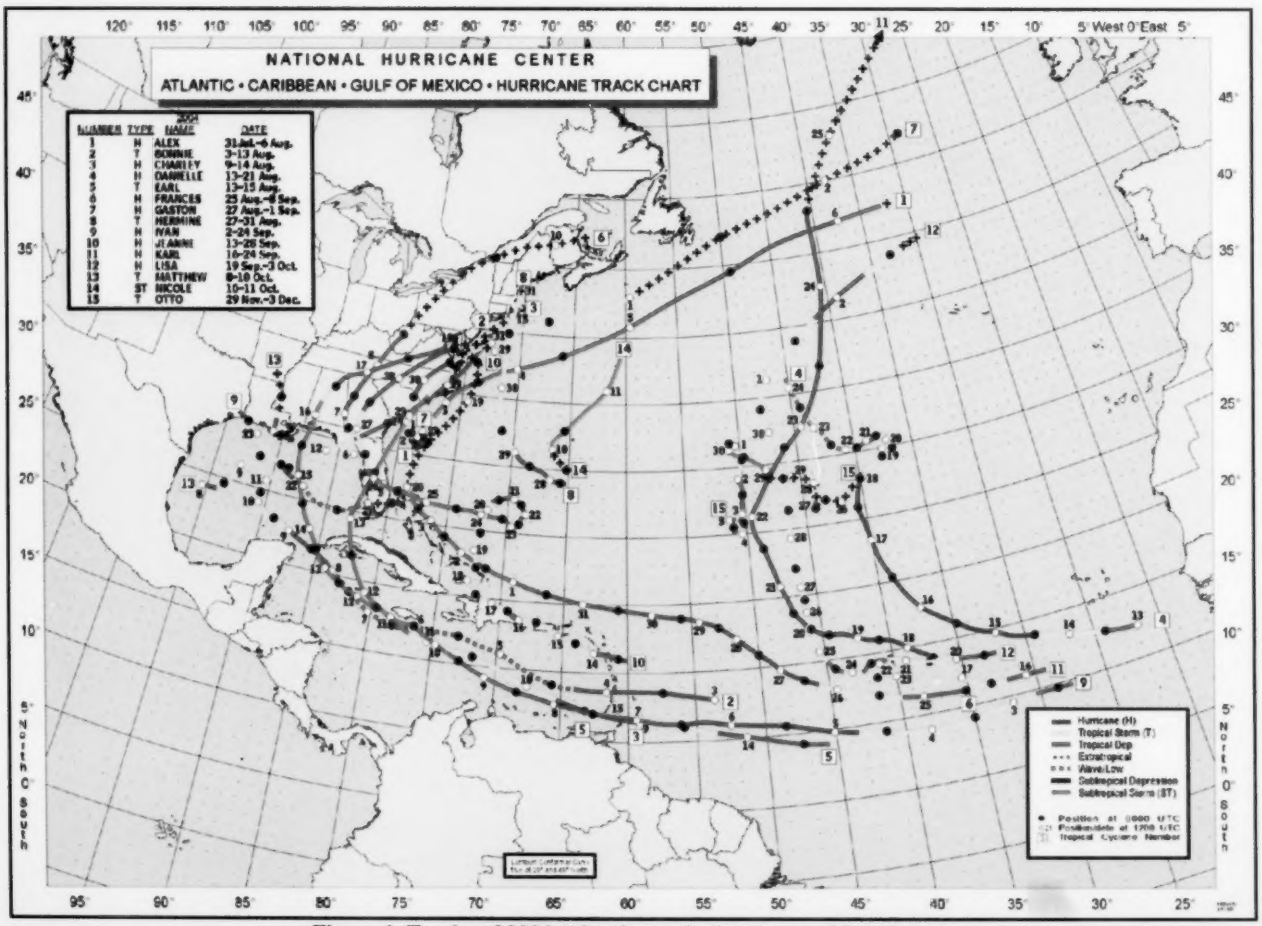


Figure 1. Tracks of 2004 Atlantic tropical storms and hurricanes.

Name	Class[a]	Dates[b]	Maximum wind (kts.)	Minimum pressure (hPa)	Direct deaths	U.S. Damage ($ millions)
Alex	H	31 Jul–6 Aug	105	957	1	5
Bonnie	TS	3–13 Aug	55	1001	3	minorc
Charley	H	9–14 Aug	130	941	15	14000
Danielle	H	13–21 Aug	95	964		
Earl	TS	13–15 Aug	45	1009		
Frances	H	25 Aug–8 Sep	125	935	8	8900
Gaston	H	27 Aug–1 Sep	65	985	8	130
Hermine	TS	27–31 Aug	50	1002		
Ivan	H	2–24 Sep	145	910	93	14200
Jeanne	H	13–28 Sep	105	950	3000+	6900
Karl	H	16–24 Sep	125	938		
Lisa	H	19 Sep–3 Oct	65	987		
Matthew	TS	8–10 Oct	40	997		minorc
Nicole	ST	10–11 Oct	45	986		
Otto	TS	29 Nov–3 Dec	45	995		

Table 1. 2004 Atlantic Tropical/Subtropical Storms and Hurricanes

[a] Tropical (TS) or subtropical storm (ST): wind speed 34-63 kts. Hurricane (H): wind speed 64 kts or higher.

[b] Dates begin at 0000 UTC and include tropical and subtropical depression stages but exclude the extratropical stage.

[c] Only minor damage was reported, but the extent of the damage was not quantified.

five other tropical cyclones in the Atlantic basin since 1851. In addition, Ivan was a major hurricane for a total of 10 days, a new record for a single storm since the most reliable records began in 1944.

Individual Storms

The vital statistics of the named storms of 2004 are given in ***Table 1***, while the tracks are shown in ***Figure 1***. The track of the tropical depression is shown in ***Figure 2***. In the cyclone summaries given below, all dates are based on Universal Coordinated Time, although local time is implied with expressions such as "afternoon," "mid-day," etc.

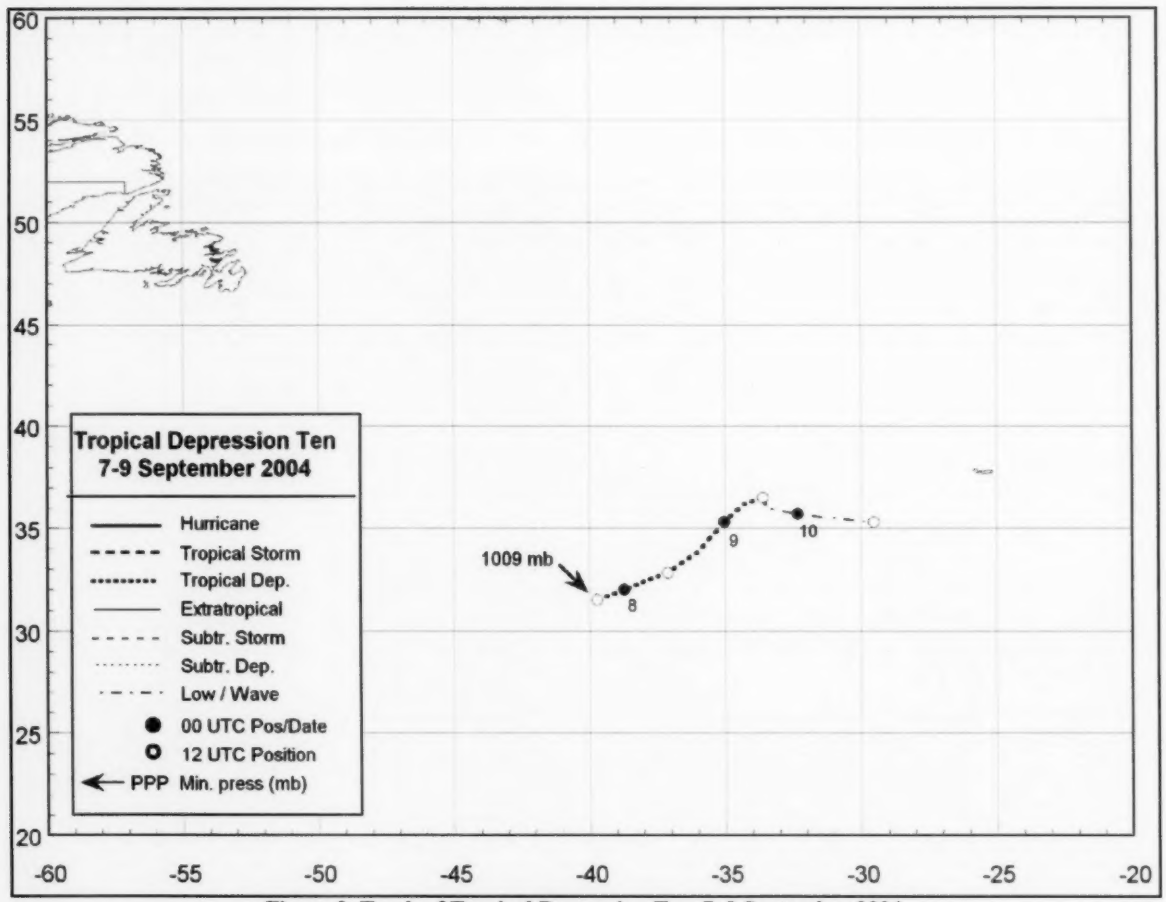


Figure 2. Track of Tropical Depression Ten, 7–9 September 2004.

Hurricane Alex

Alex developed out of a broad area of low pressure that formed near the central Bahamas on 30 July. Associated thunderstorm activity gradually became better organized and the system became a tropical depression on 31 July about 175 nmi off the northeastern Florida coast. Drifting erratically, the depression strengthened to a tropical storm the following day when northeasterly shear over the cyclone decreased. Alex started to move northeastward early on 2 August, slowly approaching the coastline of the Carolinas over the next 36 hours. Alex strengthened, becoming a hurricane on 3 August when it was centered about 65 nmi south-southeast of Cape Fear. Aided by warm Gulf Stream waters and light shear, Alex continued to strengthen during the day as it neared the North Carolina Outer Banks. Alex made its closest approach to land near midday, with its center located about 9 nmi southeast of Cape Hatteras, North Carolina, while the western eyewall of the hurricane raked the Outer Banks with sustained category 1 hurricane force winds. During this close approach the hurricane's category 2 winds remained just offshore. After passing the Outer Banks, Alex accelerated into the open Atlantic, becoming a major hurricane on 5 August about 385 nmi south-southwest of Halifax, Nova Scotia with maximum winds estimated at 105 kts. Only Hurricane Ellen of 1973 attained major hurricane status at a higher latitude. Alex then proceeded to weaken over colder waters and became extratropical on 6 August.

Shipping avoided the core of Alex. Selected ship reports from the outer circulation are included in ***Table 2***. The most significant observation was from the **Charles Island** (C6JT), which reported winds of 50 kts at 0000 UTC 4 August. On the coast, sustained winds of 67 kts with a gust to 91 kts were reported at Hatteras Village, North Carolina at 1814 UTC 3 August. It should be noted that the National Atmospheric and Oceanographic Administration (NOAA) Buoy 41025 near Diamond

Shoals, North Carolina broke loose from its moorings as the core of Alex passed over it.

Tropical Storm Bonnie

Bonnie developed from a tropical wave, becoming a tropical depression on 3 August about 360 nmi east of Barbados in the Lesser Antilles. The depression moved rapidly westward and did not maintain a closed surface circulation. The system degenerated to an open wave the next day in the eastern Caribbean Sea, but a depression redeveloped from it four days later about 100 nmi southeast of the western tip of Cuba. The depression moved west-northwestward and became a tropical storm near the northeastern tip of the Yucatan Peninsula the next day. Bonnie moved into the central Gulf of Mexico and then turned northeastward on 11 August, reaching its maximum intensity of 55 kts later that day. Strong southwesterly wind shear then became established over the cyclone, causing weakening. Bonnie made landfall just south of Apalachicola, Florida, during the afternoon of 12 August with maximum sustained winds of 40 kts winds. The cyclone weakened to a tropical depression over land and moved northeastward across eastern Georgia and the Carolinas. Bonnie degenerated to a weak area of low pressure near Cape Cod on 14 August.

The strongest marine winds reported in Bonnie were from NOAA buoy 42001, which reported sustained winds of 51 kts with a gust to 66 kts at 1440 UTC 11 August. Two ships also reported tropical-storm force winds. The **Celebration** (H3GQ) reported winds of 40 kts at 1800 UTC 10 August, while with the **Schackenborg** (ZCIH7) reported sustained winds of 37 kts at 0900 UTC that same day.

Bonnie had little impact on the Florida coast. However, it caused 30 tornadoes over the southeastern United States, one of which caused three deaths in North Carolina.

Hurricane Charley

Charley originated from a tropical wave, developing into a tropical depression on 9 August about 100 nmi south-southeast of Barbados. The depression strengthened within a low-shear environment to a tropical storm early the next day in the eastern Caribbean, and became a hurricane on 11 August just south of Jamaica. Charley's center passed about 15 miles northeast of Grand Cayman as the hurricane reached category 2 strength on 12 August. Charley turned to the north-northwest and continued to strengthen, making landfall in western Cuba as a category 3 hurricane with 105 kts maximum winds. Charley weakened slightly after its passage over western Cuba; its maximum winds were about 95 kts when the center reached the Dry Tortugas around 8 am EDT on 13 August.

Charley then came under the influence of an unseasonably strong mid-tropospheric trough that covered the east-central United States and the eastern Gulf of Mexico. The hurricane turned north-northeastward and accelerated toward the southwest coast of Florida, intensifying reapidly as it did so. Reports from Air Force Reserve Hurricane Hunter aircraft indicate that Charley's central pressure fell from 964 hPa to 941 hPa in the last 4.5

Date/Time (UTC)	Ship call sign/name	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (hPa)
02 / 1200	Buoy 30408	32.5	78.7	010 / 37	1003.0
03 / 0000	Buoy 30408	32.5	78.7	010 / 37	1003.0
04 / 0000	**Charles Island**	33.0	72.3	180 / 50	1010.0
04 / 1800	**Enterprise**	36.0	67.9	240 / 40	1004.1
04 / 2100	**Enterprise**	36.4	68.3	240 / 40	1003.5
05 / 1200	**OOCL Fortune**	35.7	59.9	220 / 36	1012.6
05 / 1500	**Sealand Developer**	39.3	55.9	210 / 40	1015.8
05 / 1800	**Sealand Developer**	39.3	56.5	230 / 35	1007.1
05 / 1800	**Zim Pacific**	39.7	48.3	200 / 37	1014.0
05 / 2100	**Choyang Phoenix**	37.7	56.5	230 / 35	1011.0
06 / 1200	**Hansa India**	43.0	42.3	240 / 40	1010.5

Table 2. Selected ship and drifting buoy reports with winds of at least 34 kts for Hurricane Alex, 31 July–6 August.

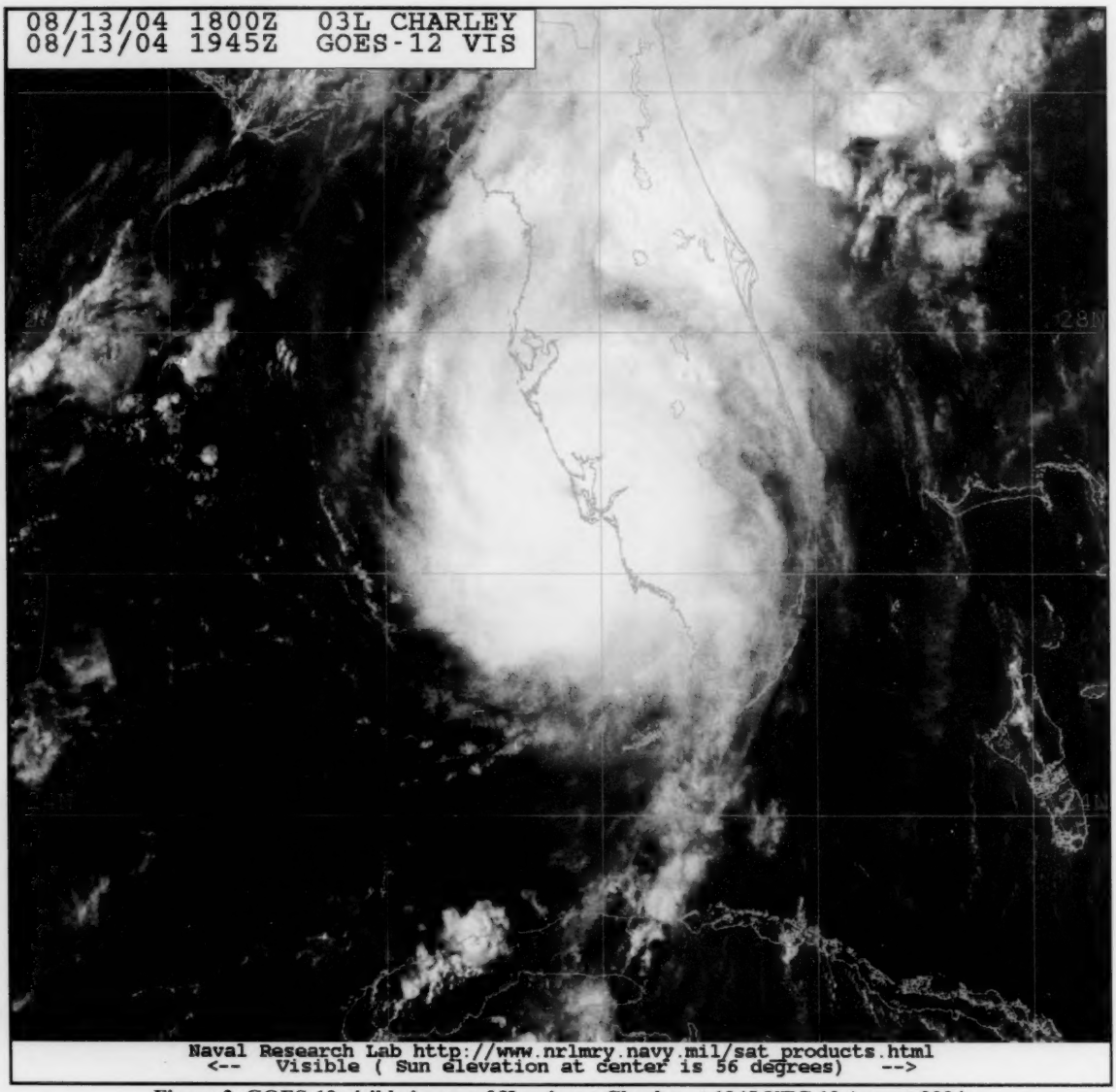


Figure 3. GOES-12 visible image of Hurricane Charley at 1945 UTC 13 August 2004.

Image courtesy of the Naval Research Laboratory, Montetey, CA.

hours before landfall near Captiva Island, Florida, with maximum sustained winds increasing to 130 kts—a category 4 hurricane (***Figure 3***). The center of the unusually small hurricane then crossed the Florida peninsula, passing near Punta Gorda, Kissimmee, and Orlando. Charley was still a hurricane around midnight 14 August when its center cleared the northeastern coast of Florida near Daytona Beach. After moving into the Atlantic, Charley came ashore again near Cape Romain, South Carolina near midday on 14 August with maximum sustained winds near 70 kts. The center then moved just offshore before making a final landfall at North Myrtle Beach, South Carolina with maximum sustained winds near 65 kts. Charley weakened to a tropical storm over southeastern North Carolina and became extratropical on 15 August as it moved back into the Atlantic near Virginia Beach, Virginia.

Several ships encountered Charley (***Table 3***), but none were hit by the small, but intense, inner core of the hurricane. The highest winds were from the **Edyth L** (C6YC), which reported 55 kts at 0900 UTC 13 August. Additionally, NOAA buoy 41004 reported sustained winds of 43

kts with a gust to 64 kts at 1250 UTC 14 August. Among the various coastlines affected by Charley, Playa Baracoa, Cuba reported sustained winds of 103 kts with a gust to 130 kts at 0530 UTC 13 August. Charley destroyed the NOAA Coastal Marine Automated Network (C-MAN) station at Dry Tortugas, Florida, before it could report the worst observed conditions. Many stations along the storm track across the Florida Peninsula were damaged and did not report the strongest winds.

The total U. S. damage is estimated to be near $14 billion, making Charley the third costliest hurricane in U.S. history. Charley was directly responsible for ten deaths in the United States. There were also four deaths in Cuba and one in Jamaica.

Hurricane Danielle

A vigorous westward-moving tropical wave moved across the west coast of Africa early on 12 August, and spawned a tropical depression on 13 August about 450 nmi southeast of the Cape Verde Islands. The cyclone strengthened quickly, becoming a tropical storm on 14 August and a hurricane the next day. Danielle spent its lifetime over the open waters of the central Atlantic, reaching a peak intensity of 95 kts on 16 August before weakening and ultimately degenerating into a non-convective remnant low pressure system on 21 August.

There were no ship or land reports of tropical-storm force or greater winds from Danielle.

Tropical Storm Earl

Earl was a short-lived tropical storm that formed from a tropical wave on 13 August about 1,000 nmi east of the Windward Islands. It moved quickly westward and became a tropical storm the next day. Earl crossed the Windward Islands on 15 August as it reached its estimated peak intensity of 45 kts. It then weakened rapidly, degenerating to an open tropical wave later that day over the eastern Caribbean Sea.

There were no ship reports of winds of tropical-storm force associated with Earl while it was a tropical cyclone. After Earl degenerated to an open wave, however, two ships reported tropical storm force winds associated with the fast-moving wave over the central Caribbean Sea. The **Buffalo Soldier** (WWXB) reported 35 kts east winds on 17 August just north of Colombia, while ship **Maersk Newark** (A8CF2) reported 37 kts east winds on 16 and 17 August just south of Haiti. There were no reports of tropical-storm force winds from the Windward Islands due to Earl, and only minor damage was reported there.

Hurricane Frances

Frances developed from a tropical wave, becoming a tropical depression on 25 August 655 nmi west-southwest of the southern Cape Verde Islands, a tropical storm later that day, and a hurricane the following day. Frances moved generally west-northwestward for the next several days, passing

Date/Time (UTC)	Ship call sign/name	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (mb)
10 / 2100	**Name Unknown** (WCZ523)	16.1	70.2	110 / 47	1010.0
11 / 0100	Buoy 41545	22.1	71.1	NA / 39	1018.7
13 / 0900	**Edyth L**	23.4	82.0	160 / 55	1008.0
14 / 0600	**Sheila McDevitt** (WDA406)	29.1	77.4	130 / 35	1018.0
14 / 1200	**Sheila McDevitt** (WDA406)	28.9	78.6	150 / 35	1017.1
14 / 1500	**Lykes Navigator**	31.7	77.6	180 / 38	1018.3
15 / 0300	**APL Egypt** (A8BZ6)	37.0	74.6	220 / 42	1017.0

Table 3. Selected ship and drifting buoy reports with winds of at least 34 kts for Hurricane Charley, 9–14 August 2004.

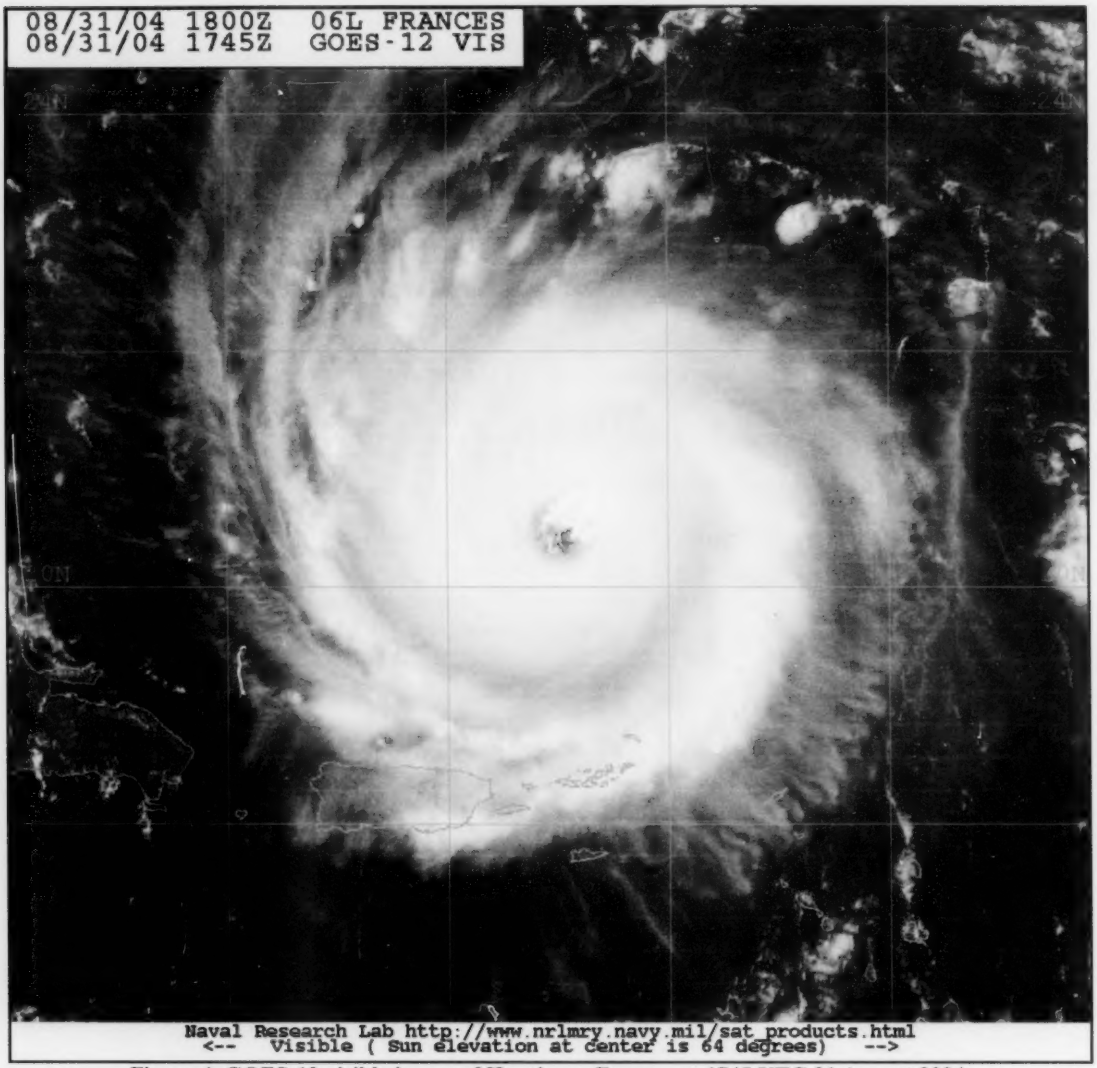


Figure 4, GOES-12 visible image of Hurricane Frances at 1745 UTC 31 August 2004.

Image courtesy of the Naval Research Laboratory, Monterey, CA.

north of the Leeward Islands on 31 August (***Figure 4***) and just north of the Turks and Caicos Islands on 2 September. During this time, maximum sustained winds reached 125 kts (category 4) on two occasions, with a reconnaissance aircraft measuring a minimum central pressure of 935 hPa. Westerly wind shear then caused Frances to weaken to a category 2 hurricane by the time it passed over the northwestern Bahamas on 4 September. The hurricane made landfall near Stuart, Florida just after midnight on 5 September with 90 kts (category 2) maximum winds. Frances gradually weakened as it moved slowly across the Florida peninsula, and became a tropical storm just before emerging into the northeastern Gulf of Mexico early on 6 September. Frances made a final landfall in the Florida Big Bend region that afternoon as a tropical storm. It subsequently weakened over the southeastern United States and became extratropical over West Virginia on 9 September.

Shipping mostly avoided Frances as it crossed the Atlantic, although some ships encountered the outer part of the large circulation (***Table 4***). The highest winds reported were 43 kts from ship **Mariner of the Seas** (C6FV9) at 1200 UTC 5 September. Two drifting

Date/Time (UTC)	Ship call sign/name	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (hPa)
01 / 0700	Buoy 41544	23.0	66.7	090 / 37	1010.4
01 / 1600	Buoy 41544	23.1	66.7	090 / 41	1015.2
01 / 1601	Buoy 41927	23.6	70.1	080 / 93	1010.9
02 / 0000	Buoy 41543	24.0	70.7	100 / 39	1008.1
02 / 0000	Buoy 41539	24.4	69.1	090 / 35	1012.9
02 / 0000	Buoy 41545	24.4	70.4	090 / 39	1011.0
02 / 0307	Buoy 41922	22.2	71.9	NA / 35	955.2
02 / 0400	Buoy 41543	24.1	70.7	120 / 49	1009.7
02 / 0600	**Anke-Angela**	26.9	72.1	090 / 36	1016.0
02 / 0700	Buoy 41545	24.4	70.4	110 / 37	1010.8
02 / 0727	Buoy 41925	22.9	71.7	130 / 70	989.3
02 / 0906	Buoy 41934	24.6	72.0	NA / 78	N/A
02 / 0910	Buoy 41939	22.2	71.2	NA / 52	N/A
02 / 1800	Buoy 41542	27.6	69.6	NA / 58	1016.0
02 / 1841	Buoy 41927	23.6	70.1	NA / 41	N/A
03 / 0243	Buoy 41926	23.1	69.1	140 / 35	1014.6
03 / 0700	Buoy 41541	24.6	76.6	320 / 49	986.7
03 / 0700	Buoy 41542	27.6	69.6	130 / 51	1015.2
03 / 1800	Buoy 41541	24.5	76.4	200 / 58	999.0
03 / 2000	Buoy 41540	27.9	78.6	NA / 78	1009.0
04 / 0227	Buoy 41923	24.1	71.4	NA / 49	1013.8
04 / 1900	Buoy 41540	28.3	79.2	NA / 49	998.3
05 / 0000	**Zim California**	29.0	77.6	100 / 35	1012.0
05 / 0600	**Saudi Abha**	26.8	76.4	140 / 37	1005.4
05 / 1200	**Mariner of the Seas** (C6FV9)	24.2	81.5	260 / 43	1004.0
05 / 1200	**Galveston Bay**	27.3	73.8	350 / 40	1013.0
05 / 1800	SHIP	25.0	83.4	270 / 39	1004.7
06 / 0000	**Maersk New Orleans**	29.1	78.4	120 / 35	1009.0
06 / 0900	**Name Unknown** (KS004)	25.8	80.1	170 / 37	1006.9
06 / 0900	**Chevron Arizona**	27.5	86.1	350 / 37	999.5
06 / 1500	**Heidelberg Express**	28.5	79.6	130 / 39	1011.8
06 / 1800	**Sea-Land Freedom**	30.1	79.7	160 / 36	1010.0
06 / 1800	**Nordon**	31.8	79.3	120 / 35	1013.0
07 / 0000	**Nordon**	31.4	80.4	120 / 37	1009.3
09 / 0300	**Nanticoke**	42.1	81.4	050 / 38	1014.0
09 / 1200	**Canadian Progress**	42.7	80.1	000 / 35	N/A
10 / 0600	**Carnival Victory** (3FFL8)	43.1	65.1	180 / 35.11	1018.0

Table 4. Selected ship and drifting buoy reports with winds of at least 34 kts for Hurricane Frances, 25 August–8 September 2004

Date/Time (UTC)	Ship call sign/name	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (hPa)
29 / 0300	**APL Shanghai** (A8DO7)	31.5	79.8	310 / 41	1006.0
29 / 0900	**Nedlloyd Holland**	31.9	79.6	270 / 38	1003.0
29 / 1800	**OOCL Freedom**	32.8	79.0	210 / 36	1006.7
30 / 1200	**Olivia Maersk** (OXKO2)	33.9	76.6	200 / 35	1016.3
31 / 0000	**Amapola** (H9YY)	36.5	75.1	170 / 36	1010.0
31 / 1900	**Saudi Tabuk**	40.6	68.9	130 / 37	1006.8
01 / 0600	**Independence** (WRYG)	40.6	63.2	240 / 44	1006.8
01 / 0600	**Albert**	46.1	54.4	210 / 41	1010.3
01 / 1200	**Henry Goodrich**	46.4	48.4	210 / 43	1011.6
01 / 1200	Platform (VEP717)	46.7	48.7	210 / 43	1009.9
01 / 1500	**GSF Grand Banks** (YJUF7)	46.8	48.0	210 / 40	1008.9
01 / 1800	**Henry Goodrich**	46.4	48.4	210 / 41	1008.2
01 / 1800	**Finnfighter**	47.3	41.8	220 / 45	1007.0
02 / 0000	Platform (VEP717)	46.7	48.7	170 / 38	1000.0
02 / 0000	**GSF Grand Banks** (YJUF7)	46.8	48.0	180 / 35	1000.9
02 / 0600	**Finnfighter**	46.3	45.6	230 / 45	998.6
02 / 1800	**Star Ismene** (LANT5)	48.2	34.6	220 / 38	1000.0

Table 5. Selected ship reports with winds of at least 34 kts for Hurricane Gaston, 27 August–1 September 2004.

buoys reported sustained winds of 78 kts, although the reliability of these reports is uncertain. Elsewhere, Eleuthera in the Bahamas reported sustained winds of 87 kts at 1000 UTC 3 September, while Port Mayaca, Florida reported sustained winds of 74 kts at 0500 UTC 5 September.

Eight deaths resulted from the forces of the storm—seven in the United States and one in the Bahamas. U.S. damage is estimated to be near $8.9 billion, over 90% of which occurred in Florida. Widespread damage also occurred in the central and northwestern Bahamas.

Hurricane Gaston

Gaston developed slowly from an area of low pressure associated with a decaying frontal zone, and became a tropical depression on 27 August about 115 nmi east-southeast of Charleston, South Carolina. Drifting erratically, the depression became a tropical storm the next day and continued to strengthen as it began to move northward toward the coast. Gaston reached hurricane strength just before making landfall in South Carolina on the morning of 29 August between Charleston and McClellanville. The cyclone weakened as it moved across northeastern South Carolina, becoming a tropical depression late in the day. Gaston moved northeastward over North Carolina and across the Delmarva Peninsula on 30 August, and late in the day re-strengthened to a tropical storm as it moved back over water. Gaston accelerated east-northeastward and became extratropical on 1 September south of the Canadian Maritimes.

Several ships encountered Gaston, mainly during passage over the North Atlantic shipping lanes. A ship with call sign WYRG reported winds of 44 kts at 0600 UTC 1 September, while the **Finnfighter** (SBFC) twice report-

ed winds of 45 kts after Gaston became extratropical. Near the coast, an automated station at South Capers Island, South Carolina reported sustained winds of 46 kts with a gust to 71 kts at 1124 UTC 29 August, along with a minimum pressure of 985.1 hPa at 1254 UTC that day.

Gaston produced widespread flooding across South Carolina, North Carolina, and Virginia. Rainfall totals exceeding 12 inches in the Richmond area, where flash floods killed eight people. Total U.S. damage is estimated to be near $130 million. ***Table 5*** contains ship report information on Hurricane Gaston.

Tropical Storm Hermine

Hermine developed from the same decaying frontal system that spawned Hurricane Gaston. An area of showers detached from the front on 26 August and the next day a tropical depression formed about 200 nmi south of Bermuda. The cyclone moved toward the west-northwest, became a tropical storm on 29 August, and reached its estimated peak intensity of 50 kts on 30 August. The storm moved northward and began to gradually weaken under strong northerly wind shear caused by the outflow of Gaston. Hermine reached the southern coast of Massachusetts near New Bedford as a minimal tropical storm on 31 August, and became extratropical shortly thereafter.

NOAA buoy 44004 reported a wind gust to 38 kts at 2034 UTC 30 August. Hermine also brought wind gusts to tropical-storm force over eastern Massachusetts.

Hurricane Ivan

Ivan developed from a large tropical wave that crossed the west coast of Africa on 31 August and spawned a tropical depression two days later. The depression reached storm strength on 3 September (one of only twelve on record to do so south of 10 N) and continued to strengthen. By 5 September, Ivan had become a hurricane about 1,000 nmi east of Tobago in the southern Windward Islands. Eighteen hours later, Ivan became the southernmost storm of record to reach major hurricane status, at 10.2 N. Ivan was a category 3 hurricane when its center passed just south of Grenada on 7 September, a path that took the northern eyewall of Ivan directly over the island. In the Caribbean, Ivan became a category 5 hurricane, with maximum sustained winds of 140 kts, on 9 September (while south of the Dominican Republic) and maximum sustained winds of 145 kts on 11 September (***Figure 5***). The minimum central pressure measured by Air Force Reserve Hurricane Hunter aircraft twice fell to 910 hPa, once on 12 September and once on 13 September—tying the record for the sixth lowest central pressure of record for an Atlantic hurricane. The center of Ivan passed within about 20 nmi of Jamaica on 11 September and a similar distance from Grand Cayman on 12 September. Ivan then turned to the northwest and passed through the Yucatan channel on 14 September, bringing hurricane conditions to extreme western Cuba. Ivan moved

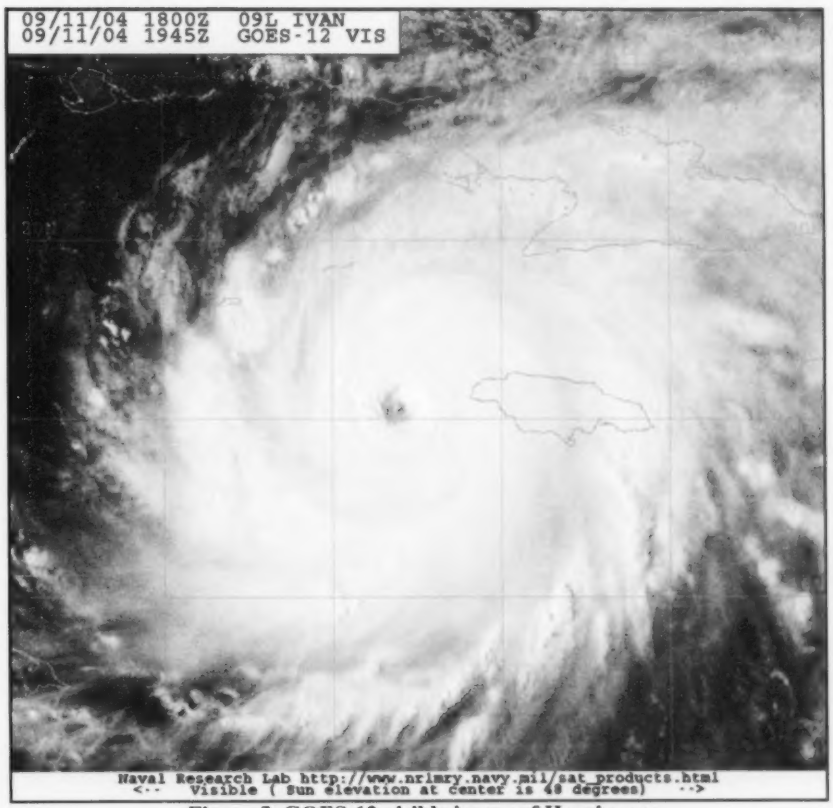


Figure 5. GOES-12 visible image of Hurricane Ivan at 1945 UTC 11 September 2004.

Image courtesy of the Naval Research, Laboratory, Monterey, CA

across the east-central Gulf of Mexico, making landfall as a major hurricane with sustained winds near 105 kts on 16 September just west of Gulf Shores, Alabama.

Ivan weakened as it moved inland, but it produced over 100 tornadoes and heavy rains across much of the southeastern United States before merging with a frontal system over the Delmarva Peninsula on 18 September. Although this would normally be the end of the story, the extratropical remnant low of Ivan split off from the frontal system and drifted southward in the western Atlantic for several days, crossed southern Florida, and re-entered the Gulf of Mexico on 21 September. The low reacquired tropical characteristics, becoming a tropical storm for the second time on 22 September in the central Gulf. Ivan weakened before it made its final landfall in southwestern Louisiana as a tropical depression on 24 September.

The highest marine winds observed during Ivan were from the oil drilling platform Ram Powell-VJ956 located about 70 nmi south of Mobile Bay, Alabama. It reported sustained winds of 102 kts with a gust to 135 kts at an elevation of 122 m at 2256 UTC 15 September. A sailboat moored at Wolf Bay, Alabama unofficially reported a wind gust to 126 kts at an elevation of 22 m at 0600 UTC 16 September. Other ship reports from Ivan are shown in ***Table 6***. Among the many islands and coastal areas affected by Ivan, the highest winds were observed at Grand Cayman Island, which reported sustained winds of 130 kts with a gust to 149 kts at 1345 UTC 12 September. Point Salines, Grenada reported sustained winds of 64 kts with a gust to 101 kts at 2100 UTC 7 September, while there was an unofficial report of sustained winds of 77 kts with a gust to 99 kts at 0602 UTC 16 September from Gulf Shores. NOAA buoy 42040 reported a significant wave height of 52.5 ft as the center of Ivan passed nearby, and the buoy broke loose from its moorings during the hurricane.

Ivan's storm surge completely overwashed the island of Grand Cayman, where an estimated 95% of the buildings were damaged or destroyed.

Date/Time (UTC)	Ship call sign/name	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	.Pressure (hPa)
04 / 1100	Buoy 13009	8.0	38.0	NA / 36	N/A
08 / 0359	**MV Son Monoy**	10.7	66.2	320 / 40G50	N/A
08 / 1200	**LNG Sokoto** (ZCDE4)	11.6	62.7	120 / 47	1007.2
11 / 0600	**Sheila McDevitt** (WDA406)	15.9	77.5	230 / 37	1002.1
12 / 0400	**JAG Prachi** (ATPN)	16.8	80.2	010 / 46	1005.0
12 / 1500	**UBC Svea** (P3JA8)	17.7	81.8	250 / 53	997.5
13 / 1800	**William Oldendorff** (A8CO2)	18.3	85.5	260 / 35	1006.8
13 / 2100	**William Oldendorff** (A8CO2)	18.3	84.9	250 / 35	1005.9
14 / 0000	**Norwegian Sea**	17.9	86.8	280 / 44	1002.0
14 / 1000	**Rhapsody of the Seas**	22.6	88.8	020 / 44	999.0
14 / 1500	**Saudi Abha**	24.5	83.3	110 / 52	1004.3
14 / 1700	**Advantage**	25.3	83.9	120 / 47	1004.0
14 / 1800	**Saudi Abha**	24.1	82.7	120 / 52	1004.4
14 / 2300	**Advantage**	24.7	83.4	140 / 52	1004.2
15 / 1200	**Star Ismene** (LANT5)	24.2	85.1	180 / 43	1005.0
15 / 1500	**Deepwater Horizon**	27.0	90.0	360 / 50	963.0

Table 6. Selected ship and drifting buoy reports with winds of at least 34 kts for Hurricane Ivan, 2–24 September 2004.

Surge heights of 10 to 15 ft occurred along the Gulf coast during Ivan's first U.S. landfall. The death toll from Ivan stands at 93—39 in Grenada, 26 in the United States, 17 in Jamaica, 4 in Dominican Republic, 3 in Venezuela, 2 in the Cayman Islands, and 1 each in Tobago and Barbados. U.S. damage is estimated to be near $14.2 billion, the second largest total on record. The hurricane also caused extensive damage on Grenada, Jamaica, and western Cuba.

Hurricane Jeanne

Jeanne formed from a tropical wave, becoming a tropical depression on 13 September near the Leeward Islands, and strengthening to a tropical storm the next day just south of the Virgin Islands. Moving west-northwestward, Jeanne struck Puerto Rico on 15 September with estimated maximum sustained winds of 60 kts and then strengthened to a hurricane just before making landfall in the Dominican Republic the next day. Jeanne spent nearly 36 hours over the rough terrain of Hispaniola, generating localized torrential rainfall before emerging into the Atlantic north of the island. Steering currents in the western Atlantic were weak, and Jeanne moved slowly through and then to the north of the southeastern Bahamas over the next three days while it gradually regained the strength it lost over Hispaniola. It then turned eastward and regained hurricane strength by 22 September. By the next day, high pressure had built in over the northeastern United States and western Atlantic, causing Jeanne to loop back westward. Jeanne strengthened and became a major hurricane on 25 September while the center moved over Abaco and then Grand Bahama Island (***Figure 6***). Early the next day, the center of Jeanne's 60-mile-wide eye crossed the Florida coast near Stuart, at virtually the identical spot that Frances had come ashore three weeks earlier. Maximum winds at the time of landfall are estimated to be near 105 kts, and a reconnaissance aircraft measured a minimum central pressure of 950 hPa a few hours before landfall.

Jeanne weakened as it moved across central Florida, becoming a tropical storm during the afternoon of 26 September near Tampa, and then weakening to a depression a day later over central Georgia. The depression

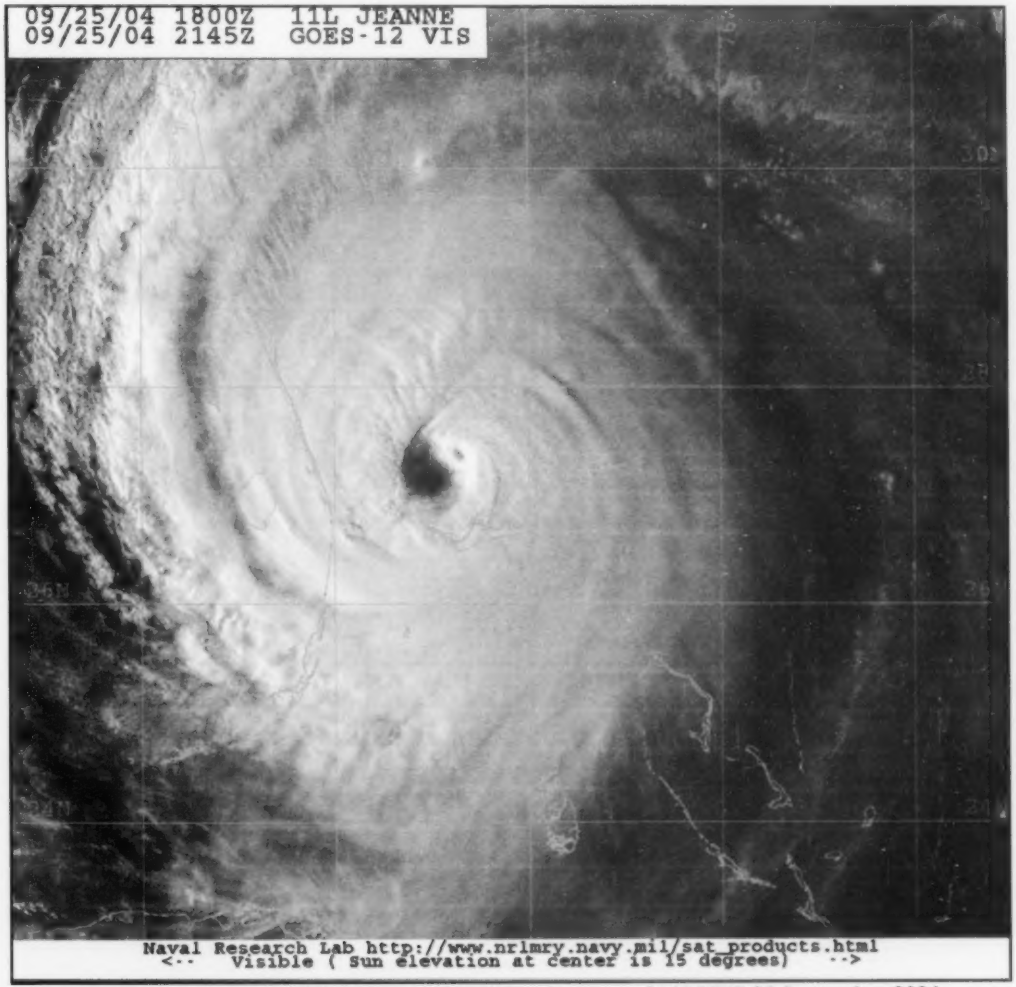


Figure 6. GOES-12 visible image of Hurricane Jeanne at 2145 UTC 25 September 2004.

Image courtesy of the Naval Research Laboratory, Monterey, CA.

was still accompanied by heavy rain when it moved over the Carolinas, Virginia, and the Delmarva Peninsula on 28 and 29 September before becoming extratropical.

Several ships encountered the outer portions of Jeanne (***Table 7***). The most significant observation was from the **London Express** (DPLE), which reported winds of 52 kts at 1200 UTC 26 September. In the Bahamas, the NOAA C-MAN station at Settlement Point on Grand Bahama reported sustained winds of 77 kts with a gust to 86 kts at 0000 UTC 26 September. Along the Florida coast, an instrumented tower at Sebastian reported sustained winds of 71 kts with a gust to 88 kts at 0647 UTC 26 September. St. Croix, USVI reported sustained winds of 45 kts with a gust to 54 kts at 0800 UTC 15 September, while San Juan, Puerto Rico reported sustained winds of 43 kts with a gust to 62 kts at 1734 UTC 15 September.

Jeanne produced extreme rain accumulations in Puerto Rico and Hispaniola, with nearly 24 inches reported on Vieques. Rains from the cyclone resulted in historic floods in Puerto Rico, and deadly flash-floods and mudslides in Haiti, where over 3,000 people were killed and roughly 200,000 were left homeless. Three

Date/Time (UTC)	Ship call sign/name	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (hPa)
15 / 0300	**Kaptian Bochek**	17.3	64.5	060 / 39	1008.3
15 / 1200	**Kaptian Bochek**	17.9	64.7	100 / 49	1008.7
16 / 1800	**CSX Discovery**	22.4	69.6	080 / 37	1014.0
21 / 0600	**Federal Progress**	29.3	77.5	300 / 35	1014.0
22 / 2100	**CSX Hawaii**	29.9	67.7	010 / 40	1011.3
24 / 2100	**CSX Challenger**	30.1	74.1	050 / 37	1008.5
25 / 1200	**El Yunque**	29.5	78.2	070 / 44	1004.8
25 / 1700	**CSX Producer**	29.8	77.6	070 / 44	1006.5
25 / 1800	**CSX Producer**	29.7	77.5	080 / 42	1005.7
25 / 1800	**Maersk Newark** (A8CF2)	30.1	79.1	060 / 44	1009.0
26 / 0000	**London Express**	25.6	80.0	270 / 45	997.3
26 / 0000	**Maersk Newark** (A8CF2)	29.5	78.6	060 / 37	1004.0
26 / 0600	**Chevron Arizona**	26.0	88.0	060 / 37	1008.5
26 / 1200	**Name Unknown** (WDB944)	27.8	79.6	160 / 42	996.0
26 / 1200	**London Express**	28.9	79.9	110 / 52	1001.2
26 / 1800	**P&O Nedlloyd Piraeus**	27.6	79.1	140 / 35	1006.0
26 / 1800	**Lykes Liberator**	29.0	79.3	140 / 39	1003.0
26 / 2100	**P&O Nedlloyd Piraeus**	27.0	79.4	180 / 35	1005.4
26 / 2300	**Lykes Liberator**	28.1	79.7	160 / 38	1000.5
27 / 0000	**Nedlloyd Holland**	29.5	80.3	150 / 50	998.9
28 / 1800	**OOCL Faith**	33.2	78.0	230 / 41	1007.0
29 / 1200	**Lykes Navigator**	36.9	72.5	260 / 35	1007.3

Table 7. Selected ship reports with sustained winds of at least 34 kts for Hurricane Jeanne, 13–28, September 2004.

deaths occurred in Florida, and one each in Puerto Rico, South Carolina, and Virginia. In the contiguous United States, damage is estimated to be near $6.9 billion. Additional damage occurred in the northwestern Bahamas, as well as in Puerto Rico and Hispaniola.

Hurricane Karl

Karl developed from a tropical wave, becoming a depression about 340 nmi southwest of the southern Cape Verde Islands on 16 September and a tropical storm the following day. Unlike its predecessors, Frances and Ivan, Karl remained over the open waters of the central Atlantic, moving generally west-northwestward from 17–20 September, north-northwestward on 21–22 September, and then generally north-northeastward for the remainder of its life as a tropical cyclone. Karl became a hurricane on 18 September and reached an estimated peak intensity of 125 kts on 21 September. Karl then weakened unsteadily and lost tropical characteristics about 510 nmi east of Cape Race, Newfoundland on 25 September. It eventually passed over Scandinavia as an extratropical low.

Ships avoided the core of Karl. Reports of winds of tropical storm force from the periphery of the cyclone given in ***Table 8***. The highest reported wind was from the **Rotterdam** (PDGS), which reported a sustained wind of 45 kts at 1800 UTC 24 September. Two drifting buoys encountered the core of Karl on 24 September. Buoy 41600 reported a pressure of 958.1 hPa at 0100 UTC, while buoy 44617 reported a pressure of 964.2 hPa at 2100 UTC.

Hurricane Lisa

Lisa developed from a tropical wave, becoming a depression on 19 September about 450 nmi west-southwest of the Cape Verde Islands. The depression became a tropical storm the next day. Lisa moved westward for a couple of days, and then interacted with an area of disturbed weather approaching Lisa from the east. The disturbance and Lisa looped about each other on 22–23 September, until the disturbance became absorbed into Lisa's circulation. This interaction and subsequent northerly wind shear caused Lisa to oscillate in strength between a 35 kts tropical storm and a 30 kts depression during 23–24 September. Lisa then resumed a westward track on 24 September before turning northward in the central Atlantic. Its strength continuing to oscillate, Lisa moved slowly northward for nearly a week before turning northeastward on 1 October ahead of a strong upper-level trough. Lisa strengthened, briefly becoming a hurricane with estimated maximum sustained winds of 65 kts on 2 October, before weakening back to a tropical storm later that day due to very cold waters and increasing vertical wind shear. Lisa became extratropical early

Date/Time (UTC)	Ship call sign/name	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (hPa)
21 / 0600	Bering Sea	19.5	43.8	150 / 35	1011.0
21 / 1540	Buoy 13600	22.4	46.8	230 / 39	1000.5
23 / 1200	Lapponian Reefer	27.6	43.1	180 / 44	1011.7
23 / 1500	Star Herdla	31.0	41.4	170 / 41	1007.0
23 / 1800	A8CR8	29.5	40.7	200 / 41	1012.0
23 / 1800	Star Herdla	31.1	41.5	190 / 39	1004.7
24 / 0600	Maersk Durban	36.4	36.0	230 / 41	1009.0
24 / 0600	Santa Maria	42.8	38.1	120 / 39	1002.4
24 / 0900	Colombo Bay	42.5	46.9	010 / 35	1003.1
24 / 1800	Rotterdam	44.4	34.5	150 / 45	1009.3

Table 8. Selected ship and drifting buoy reports with winds of at least 34 kts for Hurricane Karl, 16–24 September 2004.

on 3 October about 1000 nmi east-southeast of Cape Race.

A few ships encountered the outer fringes of Lisa (***Table 9***). The most significant observation was from the ship **Snow Land** (ZCGH), which reported winds of 47 kts at 1200 UTC 29 September.

Tropical Storm Matthew

After existing for about a week as an area of disturbed weather caused by the interaction of a tropical wave and an upper-level trough, Matthew began as a depression about 180 nmi southeast of Brownsville, Texas on 8 October. The depression became a tropical storm later that day, and the cyclone reached its peak intensity of 40 kts on 9 October, after which vertical shear prevented further strengthening. Steered by a large mid- to upper-level low over western Texas, Matthew made landfall just west of Cocodrie, Louisiana the next day with maximum sustained winds of 35 kts. The weakening cyclone continued inland and was absorbed by a frontal system on 11 October.

Two ships reported tropical-storm force winds from Matthew. The **Deepwater Millenium** (3FJA9) reported winds of 39 kts at 1700 UTC 9 October, while the **Deepwater Horizon** (H3SM) reported winds of 37 kts at 0000 UTC 10 October. On the Louisiana coast, the NOAA C-MAN station at the southwest pass of the mouth of the Mississippi River reported sustained winds of 42 kts with a gust to 48 kts at 0940 UTC 10 October. The station also reported a wind gust to 83 kts during a severe thunderstorm at 1228 UTC that day.

Matthew's landfall was accompanied by rains in excess of 16 inches, and a 6 ft storm surge that included rises from winds generated by a strong pre-

Date/Time (UTC)	Ship call sign/name	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (hPa)
26 / 2100	Buoy 13602	19.8	44.0	100 / 38	1010.1
27 / 0900	**Foylebank**	20.4	42.9	130 / 35	1011.7
28 / 0940	Buoy 41595	24.5	43.5	NA / 43	1014.2
29 / 1200	**Name Unknown** (ZCGH)	28.3	46.6	320 / 47	1008.3
02 / 2100	**Lykes Navigator**	47.1	42.3	050 / 40	1013.9

Table 9. Selected ship and drifting buoy reports with winds of at least 34 kts for Hurricane Lisa, 19 Sept. - 3 Oct. 2004.

Date/Time (UTC)	Ship call sign/name	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (hPa)
09 / 2200	Buoy 41590	26.5	59.2	NA / 36	1013.1
10 / 0600	**Strong Virginian**	33.3	68.1	360 / 38	1005.7
10 / 0900	**Strong Virginian**	33.3	67.7	000 / 36	1002.5
10 / 1700	Buoy 41539	25.6	69.0	NA / 41	1012.6
11 / 0300	**Maersk Newcastle** (A8DM9)	33.3	67.7	320 / 39	1017.1
11 / 0600	**Freedom** (WDB548)	38.1	69.6	290 / 43	1007.5
11 / 1200	**Teco Trader**	35.3	61.2	190 / 45	N/A
11 / 1200	**Freedom** (WDB548)	38.3	67.4	320 / 38	1003.5
11 / 1800	**Sluisgracht**	39.4	57.1	170 / 35	998.0
11 / 1800	**Ville de Libra**	40.9	55.9	150 / 43	1003.1

Table 10. Selected ship and drifting buoy reports with winds of at least 34 kts for Subtropical Storm Nicole, 10–11 October 2004.

existing pressure gradient in the northeastern Gulf of Mexico. Damage, however, was minor.

Subtropical Storm Nicole

Nicole's genesis appears to be associated with an upper-level trough and a decaying frontal system over the southwestern North Atlantic during the first week of October. By 8 October, a broad area of surface low pressure with gale-force winds had developed about 400 nmi southeast of Bermuda. On 10 October, the system developed loosely-banded convective cloud patterns and a well-defined surface circulation center about 120 nmi south of Bermuda, marking the formation of a subtropical storm. The center of Nicole passed about 60 miles northwest of Bermuda on 11 October, and then accelerated northeastward. It reached an estimated peak intensity of 45 kts just before becoming absorbed by a potent extratropical cyclone south of Nova Scotia later that day.

Several ships encountered Nicole, including the **Teco Trader** (KSDF) which reported winds of 45 kts at 1200 UTC 11 October (***Table 10***). Bermuda reported sustained winds of 39 kts with a gust to 48 kts at 2018 UTC 10 October.

Tropical Storm Otto

An extratropical low formed on 26 November about 1,000 nmi southwest of the Azores. The low drifted southwestward and gradually acquired central convection over the next couple of days. It is estimated that the low became a subtropical storm on 29 November about 1,000 nmi east-southeast of Bermuda. After reaching an estimated peak intensity of 45 kts as a subtropical storm, Otto transformed into a tropical storm on 30 November. Thereafter, Otto gradually weakened to a tropical depression on 2 December and a non-convective remnant low on 3 December. The low dissipated on 5 December about 800 nmi northeast of the Leeward Islands.

Although Otto was far from either land or the main North Atlantic shipping lanes, several ships reported tropical-storm force winds (***Table 11***). The strongest observed wind was from the **Star Hansa** (LAXP4) which reported 51 kts at 1800 UTC 29 November. While this might justify a higher peak intensity for Otto, a quality control check by the NOAA Ocean Prediction Center suggests the reported winds may have been a little too high.

Tropical Depression Ten

The only tropical depression of the 2004 season that did not become a tropical storm formed on 7 September about 630 nmi southwest of the westernmost Azores. Strong vertical wind shear prevented additional development while the system moved northeastward on 8–9 September, and the system weakened to a non-convective remnant low on 9 September. The low dissipated the next day about 230 nmi west-southwest of the southernmost Azores.

Acknowledgments:

The cyclone summaries are based on reports prepared by the authors and the other Hurricane Specialists at the National Hurricane Center: Lixion Avila, Miles Lawrence, Richard Pasch, and Stacy Stewart. Additional material was contributed by Eric Blake, Dan Brown, Hugh Cobb, Colin McAdie, and David Roberts. Stephen Baig prepared the track map.

Date/Time (UTC)	Ship call sign/name	Latitude (°N)	Longitude (°W)	Wind dir/speed (kts)	Pressure (hPa)
26 / 0000	**Maersk Nantes** (V2OO7)	33.0	41.1	070 / 37	1015.0
29 / 0600	**Jing Yang**	31.0	48.0	070 / 39	1005.0
29 / 1200	**Jing Yang**	30.3	49.6	070 / 35	1001.3
29 / 1800	**Star Hansa**	33.5	48.1	060 / 51	1008.8
29 / 1800	**Anjeliersgracht**	35.7	50.3	070 / 37	1014.1
29 / 1800	**Endeavor**	33.3	44.7	090 / 37	1013.5

Table 11. Selected ship reports with winds of at least 34 kts for Tropical Storm Otto, 29 November–3 December 2004.

Eastern North Pacific Hurricane Season of 2004

Jack Beven, Lixion Avila, Richard Pasch, National Hurricane Center/Tropical Prediction Center, NOAA/NWS Miami, FL

Introduction

The number of tropical cyclones was below average in the eastern North Pacific in 2004. There were twelve named tropical cyclones; six of these became hurricanes. Three of the hurricanes reached category 3 or higher intensity on the Saffir Simpson hurricane scale, all far from land. The long term averages for this basin are sixteen named tropical cyclones and nine hurricanes. In addition, there were 4 tropical depressions. The genesis of most of the tropical cyclones was associated with westward-moving tropical waves.

The season was benign, with no reports of deaths or damage attributed to tropical cyclones. None of the cyclones made landfall as tropical storms or hurricanes. However, Javier reached Baja California as a tropical depression, and Tropical Storm Lester brushed the southwest coast of Mexico. Tropical Depression Sixteen-E made landfall on the west coast of Mexico, producing heavy rains.

There were only two ship observations of tropical-storm force winds during the season, one from Hurricane Howard and the other from Hurricane Javier.

Individual Storms

The vital statistics of the named storms of 2004 are given in ***Table 1***, while the tracks are shown in ***Figure 1***. The tracks of the tropical depressions are shown in ***Figure 2***. In the cyclone summaries given below, all dates are based on Universal Coordinated Time, although local time is implied with expressions such as "afternoon," "mid-day," etc.

Tropical Storm Agatha

Agatha, the first tropical cyclone of the season, formed from an area of

Name	Class[a]	Dates[b]	Maximum wind (kts.)	Minimum pressure (hPa)	Deaths
Agatha	TS	22–24 May	50	997	
Blas	TS	12–15 Jul	55	991	
Celia	H	19–25 Jul	75	981	
Darby	H	26 Jul–1 Aug	105	957	
Estelle	TS	19–24 Aug	60	989	
Frank	H	23–26 Aug	75	979	
Georgette	TS	26–30 Aug	55	995	
Howard	H	30 Aug–5 Sep	120	943	
Isis	H	8–16 Sep	65	987	
Javier	H	10–19 Sep	130	930	
Kay	TS	4–6 Oct	40	1005	
Lester	TS	11–13 October	45	1000	

Table 1. 2004 Eastern North Pacific tropical storms and hurricanes.

[a] Tropical storm (TS): wind speed 34-63 kts. Hurricane (H): wind speed 64 kts or higher.

[b] Dates begin at 0000 UTC and include tropical depression stages.

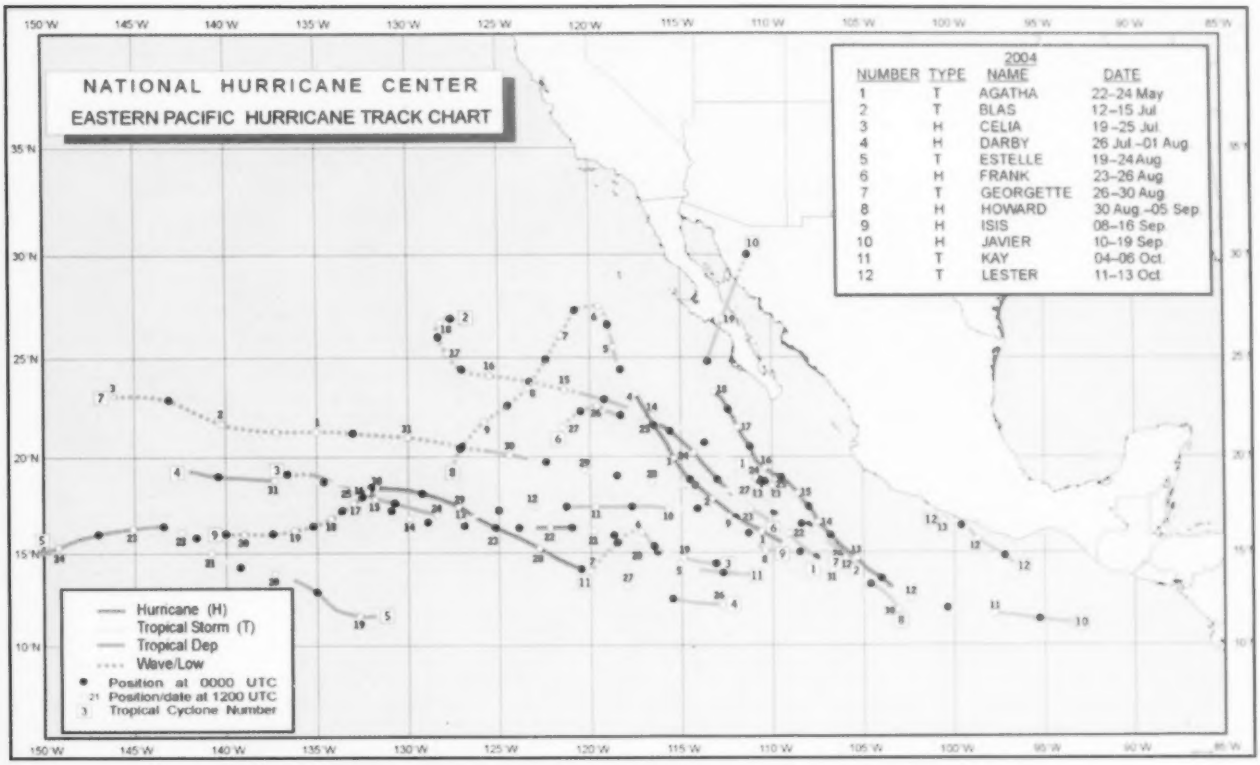


Figure 1. Tracks of 2004 Eastern North Pacific tropical storms and hurricanes.

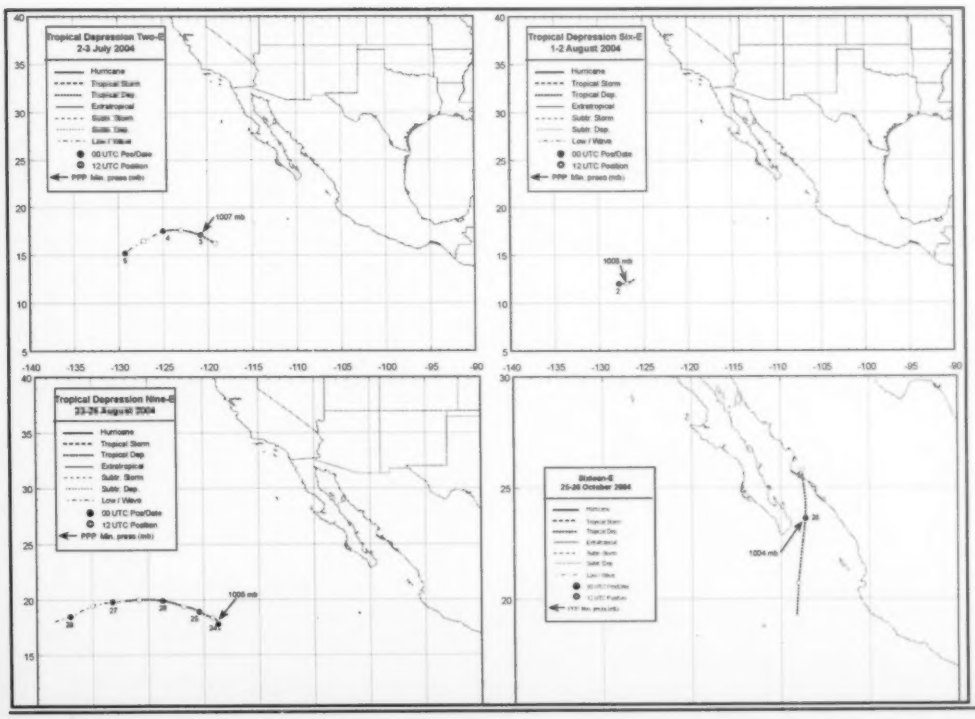


Figure 2. Tracks of 2004 Eastern North Pacific tropical depressions.

disturbed weather associated with a tropical wave and a nearly stationary area of low pressure. It first became a tropical depression on 22 May about 500 nmi south-southeast of Cabo San Lucas, Mexico. The cyclone moved slowly toward the northwest and strengthened under light vertical wind shear. It is estimated that it became a tropical storm later that day and reached its estimated peak intensity of 55 kts on 23 May. Soon thereafter, cooler sea surface temperatures and stable air caused the cyclone to weaken, and Agatha degenerated into a nearly stationary remnant low by 24 May. This low dissipated about 305 nmi south of Cabo San Lucas on 25 May.

Tropical Storm Blas

Blas formed from a tropical wave that emerged from western Africa on 1 July and crossed Central America on 8 July. Over the next several days, deep convection increased and slowly became organized to the south of Mexico. The system became a tropical depression on 12 July about 280 nmi south of Manzanillo, Mexico, and strengthened into a tropical storm later that day. The storm moved northwestward at a relatively fast forward speed around the southwest side of a mid-level anticyclone centered over the southwestern United States, and reached its estimated peak intensity of 50 kts on 13 July. Blas moved over cooler waters and weakened to a tropical depression by the 14th. It soon degenerated into a remnant low that dissipated well to the west of central Baja California. Blas had a large circulation that affected Baja California even though the center remained well offshore. An automated station just north of Cabo San Lucas at an elevation of 225 m above sea level reported a maximum sustained wind of 41 kts at 1630 UTC 13 July and a peak gust of 57 kts at 1750 UTC that day. Shipping avoided the strongest winds associated with Blas, as no ships reported tropical-storm force winds.

Hurricane Celia

Celia, the first hurricane of the season, formed from a fairly vigorous tropical wave that moved across the west coast of Africa on 5 July. The wave moved westward across the tropical Atlantic and northern South America for the next week and emerged over the northeastern Pacific Ocean near Panama on 13 July. There, a low-level circulation became better defined and convection gradually increased. It was not until early on 19 July, however, that the convective organization and circulation increased sufficiently for the system to be designated a tropical depression. By then, the cyclone was located about 540 nmi south-southwest of Cabo San Lucas. Steady development continued while the cyclone moved west-northwestward around the southern periphery of a subtropical high pressure ridge. It is estimated that the depression became a tropical storm later on 19 July and reached an estimated maximum intensity of 75 kts on 20 July. Thereafter, Celia began a slow weakening trend as it moved over cooler water, becoming a depression on 24 July and eventually degenerating into a remnant low on 26 July. The system dissipated later that day about 1510 nmi west-southwest of Cabo San Lucas.

Hurricane Darby

Darby's formation is associated with a tropical wave that reached the eastern Pacific on 20 July and first showed signs of organization on 24 July. A tropical depression subsequently formed on 26 July about 660 nmi south-southwest of Cabo San Lucas. The tropical cyclone moved west-northwestward and strengthened to a tropical storm the next day. Darby became a hurricane on 28 July and reached its estimated maximum intensity of 105 kts the next day (***Figure 3***). Darby turned westward on 30 July as it weakened to a tropical storm. The cyclone became a depression on 31 July shortly before entering the central Pacific tropical cyclone basin.It continued westward and dissipated on 1 August about 740 nmi east of the Hawaiian Islands. The remnants of Darby continued westward in the low-level trade winds and caused heavy rains and flooding over portions of the Hawaiian Islands on 3–4 August.

Tropical Storm Estelle

Estelle formed from an area of disturbed weather in the Intertropical Convergence Zone that was enhanced by the arrival of a tropical wave. It became a tropical depression on 19 August about 1250 nmi east-southeast of Hilo, Hawaii. Based on surface wind data from the National Aeronautics and Space Administration (NASA) QuikSCAT satellite, it is esti-

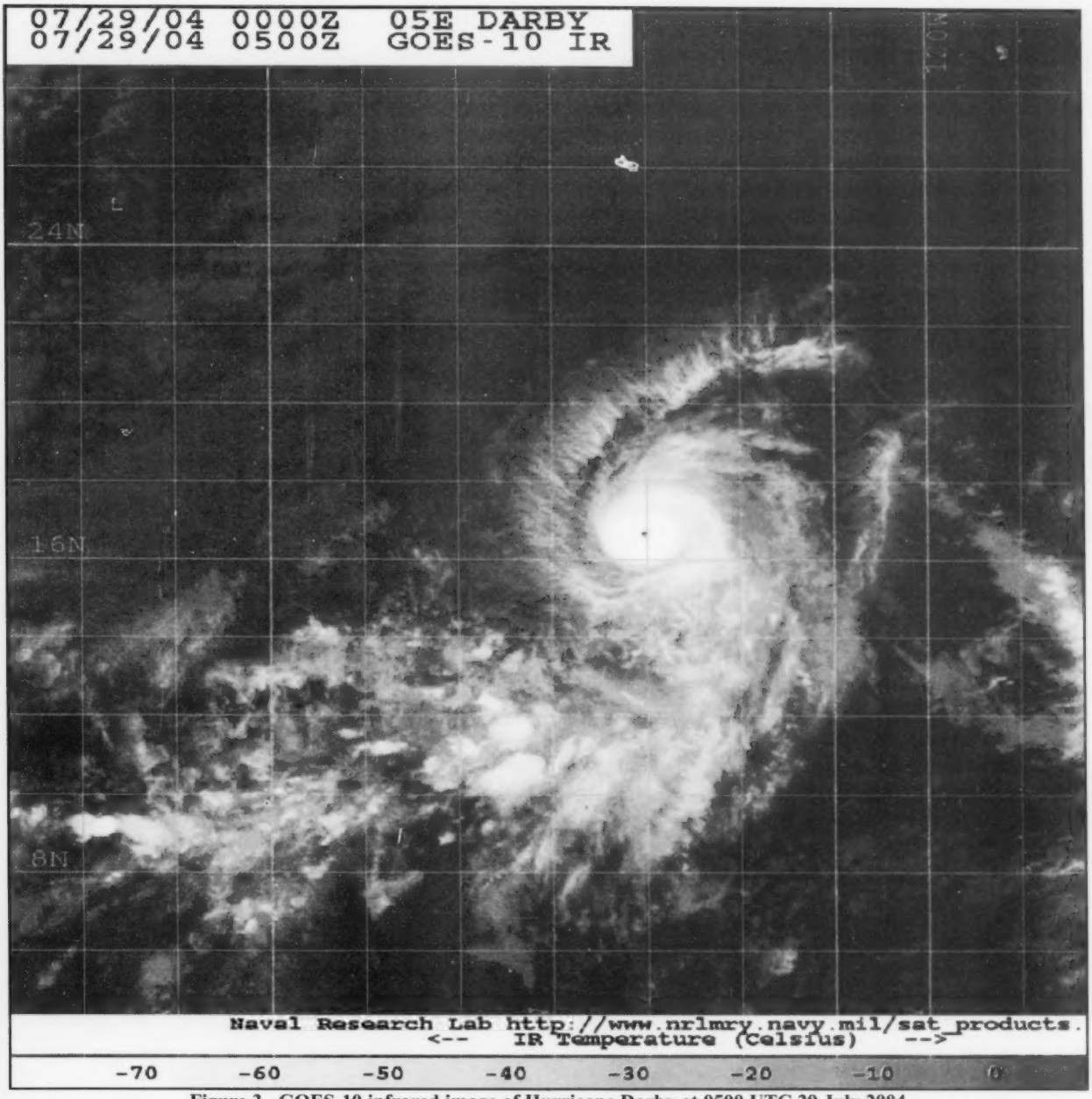


Figure 3. GOES-10 infrared image of Hurricane Darby at 0500 UTC 29 July 2004.

Image courtesy of the Naval Research Laboratory, Monterey, CA.

mated that the cyclone reached tropical storm status on 20 August. Estelle moved toward the west-northwest and its maximum winds reached an estimated 60 kts on 21 August.

Thereafter, the cyclone began to move toward the west and west-southwest, and weakened due to strong wind shear. Estelle became a remnant low on 24 August and dissipated on 26 August about 305 nmi south of the Hawaiian Islands.

Hurricane Frank

Frank formed from the same wave that spawned Tropical Storm Earl in the Atlantic Ocean. The wave continued westward after Earl dissipated and crossed Central America on 18 August. Over the next five days, deep

convection gradually increased and by early on 23 August, the convection was organized enough to classify the system as a tropical depression about 360 nmi south of Cabo San Lucas. Rapid development then occurred, and it is estimated that the cyclone strengthened into a tropical storm and then a hurricane later that day, the latter when an eye feature became apparent in visible and microwave imagery. Frank moved west-northwestward to northwestward and reached its estimated peak intensity of 75 kts on 24 August. Thereafter, Frank gradually weakened due to cooler sea-surface temperatures and turned back toward the west-northwest. The circulation remained well-defined but the cyclone finally degenerated into a remnant low on 26 August and dissipated later that day about 650 nmi miles west-southwest of Cabo San Lucas.

Tropical Storm Georgette

Georgette formed from a tropical wave that reached the Gulf of Tehuantepec on 24 August. Surface winds measured during a QuikSCAT overpass indicated a weak surface low pressure area formed along the wave axis early the next day. The cloud pattern became sufficiently well-organized to designate the system a tropical depression on 26 August, about 525 nmi south-southeast of Cabo San Lucas. Deep convection continued to become better organized and it is estimated that the tropical cyclone strengthened into a tropical storm later that day. The storm reached its estimated peak intensity of 50 kts on 27 August. Shortly thereafter, upper-level northeasterly wind shear became established over the cyclone. Georgette slowly weakened while it moved west-northwestward over cooler water, and degenerated into a remnant low on 30 August. The low remained devoid of significant convection while it moved west-northwestward over progressively colder water for the next 4 days. It dissipated early on 3 September about 520 nmi northeast of the Hawaiian Islands.

Hurricane Howard

The tropical wave that spawned Howard reached the eastern North Pacific on 26 August. Development began on 29 August and a tropical depression formed the next day about 350 nmi south-southwest of Acapulco, Mexico. It moved toward the west-northwest away from the coast, becoming a tropical storm on 31 August and a hurricane on 1 September. Howard turned northwestward and reached an estimated peak intensity of 120 kts on 2 September (***Figure 4***). This was followed by a gradual weakening as Howard moved northwestward over cooler sea surface temperatures. Howard weakened to a tropical storm on 4 September and the cyclone became a remnant low the next day about 230 nmi west-southwest of Punta Eugenia, Mexico. The remnant low first moved slowly northwestward and then southwestward, finally dissipating about 1,000 nmi west-southwest of Cabo San Lucas on 10 September.

The only observation of tropical-storm force winds in Howard was from the ship **Strong Virginian** (KSPH), which reported winds of 37 kts at 0600 UTC 4 September.

Hurricane Isis

The disturbance that developed into Isis was a tropical wave that entered the eastern North Pacific basin on 3 September and continued westward for several days. By 8 September, when the disturbance was located about 460 nmi south of Cabo San Lucas, Mexico, it had sufficient circulation and convective organization to be considered a tropical depression. The depression strengthened into a tropical storm later that day and moved generally westward for the next several days. Under easterly shear, the cyclone weakened back to a depression on 10 September when its deep convection temporarily evaporated. Isis re-strengthened to a tropical storm on 12 September about 725 nmi west-southwest of Cabo San Lucas, and its maximum winds reached 45 kts later that day. There was little change in strength until 14 September. The easterly shear had been decreasing, and late on 14 September Isis again re-strengthened—this time rapidly. Isis developed a "ragged eye", and it is estimated that the cyclone reached a peak intensity of 65 kts on 15 September while centered about 1260 nmi west of Cabo San Lucas. As quickly as the eye developed, it disappeared. Isis moved over cool waters and steering currents collapsed, resulting in little motion and significant weakening. The system degenerated into a remnant low on 16 September about 1,300 nmi west of Cabo San Lucas. The remnant low drifted southwestward and then westward for a few days, generating intermittent convection before dissipating on 21 September about 875 nmi east of the Hawaiian Islands.

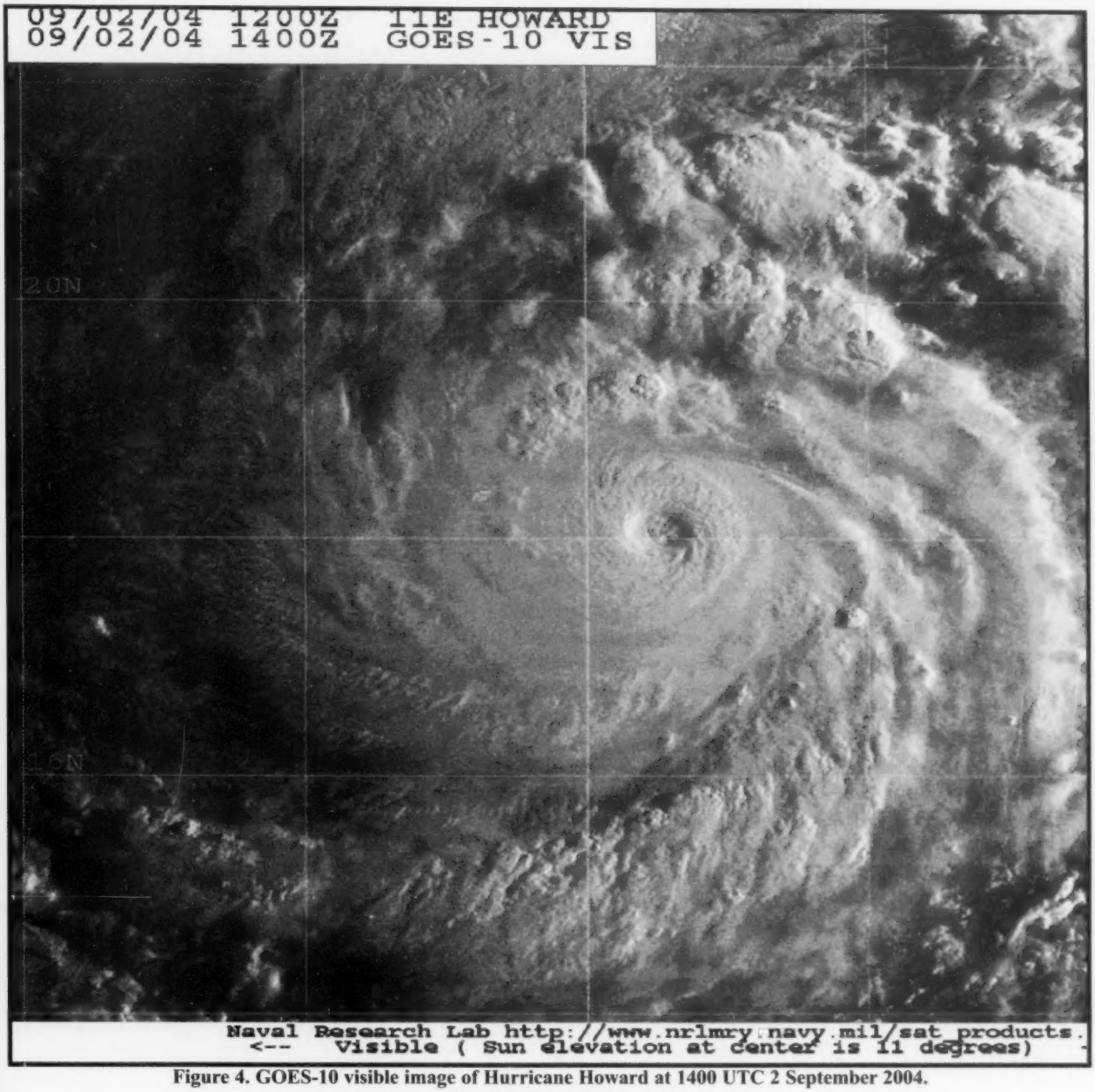


Figure 4. GOES-10 visible image of Hurricane Howard at 1400 UTC 2 September 2004.

Image courtesy of the Naval Research Laboratory, Monterey, CA.

Hurricane Javier

Javier, the strongest hurricane of the season, formed from a tropical wave that entered the eastern Pacific on 9 September and moved westward with deep convection but limited upper-level outflow. As the upper-level winds became more favorable, the system developed into a tropical depression on 10 September about 300 nmi south-southeast of Salina Cruz, Mexico and became a tropical storm the next day. Under light wind shear, Javier continued to strengthen and reached hurricane status on 12 September. The hurricane then moved slowly between the west-northwest and northwest around the periphery of a subtropical ridge centered over Mexico. On 13 September, Javier rapidly intensified as indicated by the quick development of a distinct eye. The hurricane reached its estimated

Marine Weather Review—North Atlantic Area September through December 2004

By George P. Bancroft, NOAA National Center for Environmental Prediction

Introduction

Tropical activity was concentrated during the period from September to early October, which includes what is normally the peak of the hurricane season, early September. All but one of the tropical cyclones to move over the Ocean Prediction Center's (OPC's) marine area occurred during this period and included two hurricanes (Karl and Lisa, which remained far from land) and one subtropical storm. The other, the late-season storm Otto, also remained in the open Atlantic.

Most of the significant developments of low-pressure systems during this period were after the middle of October and most tracked in a northeastward direction from the Canadian Maritime Provinces or U.S. East Coast and passed near or north of the British Isles. The most active period was late November through December as the season was progressing into winter.

Tropical Activity

Tropical Storm Gaston: See December issue of MWL for more information of Gaston as a tropical storm. Gaston became an extratropical gale south of the island of Newfoundland early on September 1, and then continued moving off to the east-northeast and dissipated just west of Ireland on September 3.

Tropical Storm Frances: After moving into central Florida as a hurricane on the night of September 4, Frances weakened to a tropical storm over northwest Florida by September 6, with effects extending into the far southwest portion of OPC's offshore waters. The ship **Nordon** (PBHU) encountered southeast winds of 35 kts near 32N 79W at 1800 UTC

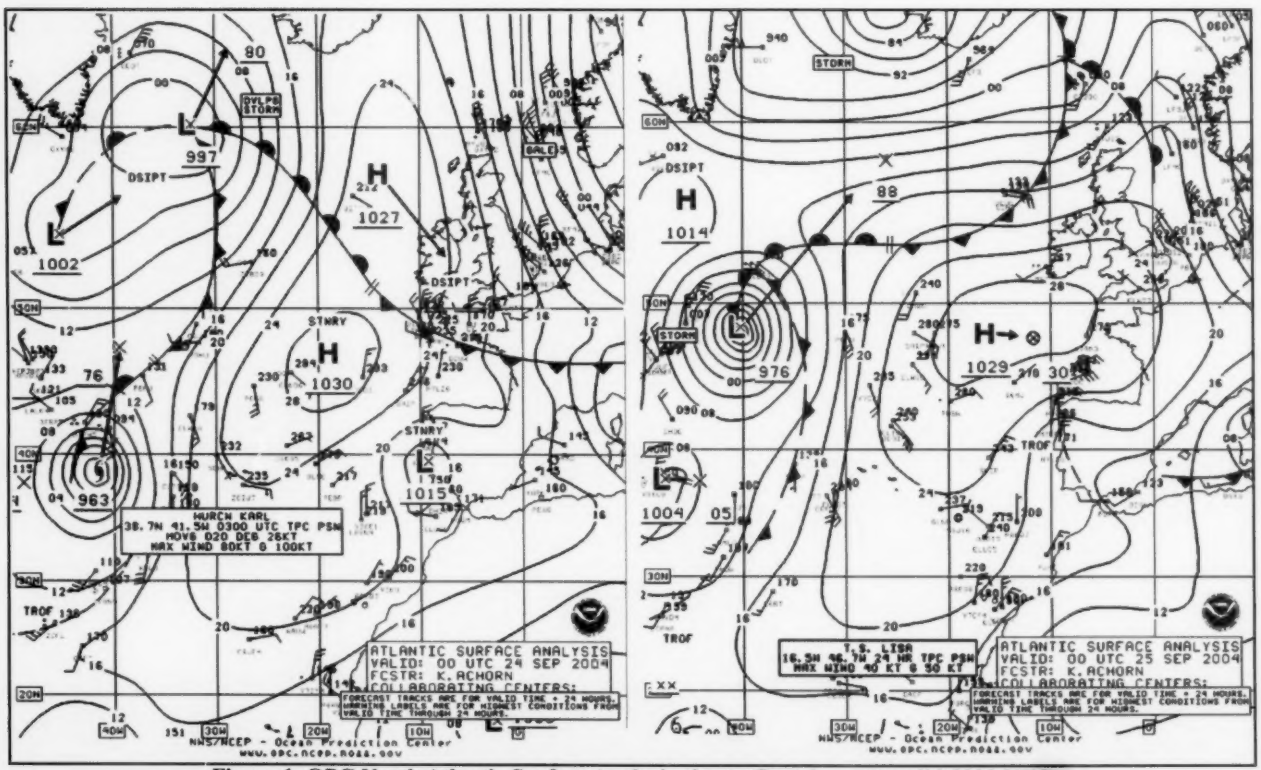


Figure 1. OPC North Atlantic Surface Analysis charts (Part 1—east) valid 0000 UTC September 24 and 25, 2004, showing Hurricane Karl becoming an extratropical storm.

September 6, and similar conditions six hours later at 32N 80W. Frances weakened to a tropical depression inland over the southeast U.S. early on September 7, before becoming extratropical inland over the middle Atlantic states late on the 8th. After crossing the Canadian Maritime Provinces during the following two days, the remains of Frances dissipated east of Newfoundland on the 11th.

Tropical Depression Ten: This cyclone was short-lived, forming from a weak low pressure area about 300 nmi southwest of the Azores early on September 9 and drifting northeast. Maximum sustained winds were 30 kts and gusts were up to 40 kts. The cyclone then dissipated as a remnant low on the night of September 9.

Tropical Depression Ivan: Formerly a major hurricane in the Gulf of Mexico, Ivan weakened to a depression inland over the southeast U.S. on September 17, before becoming an extratropical gale over the middle Atlantic states on the night of September 17. The ships **Sealand Pride** (WDA3673) (33N 77W) and **Nordon (**PBHU) (32N 78W) reported south winds of 35 kts at 0000 UTC September 18. Ivan's remains then turned east and then south off the U.S. middle Atlantic coast later on September 18, before moving south of 31N on the night of September 19.

Hurricane Karl: Karl moved north into OPC's high seas waters to near 32N 46W early on September 23 with maximum sustained winds of 110 kts and gusts to 135 kts, the strongest hurricane to affect OPC's marine area during the 2004 Atlantic hurricane season and slightly stronger than Alex in early August. At 1200 UTC September 23 the ship **Star Herdla** (LAVD4) reported a southeast wind of 40 kts at 31N 41W. Karl continued to move north and approached a frontal zone to the north while weakening through the 24th, but remained a hurricane until being declared extratropical late on September 24. ***Figure 1*** shows the transformation of Karl to an extratropical storm-force low with a 976 hPa central pressure over a twenty-four hour period ending at 0000 UTC September 25. The cyclone then moved northeast and passed southeast of Iceland with little change in intensity on the 26th. The vessel **Arnafell** (MYCP9) near 62N 5W encountered west winds of 55 kts at 1800 UTC on September 26.

Tropical Depression Jeanne: While Hurricane Jeanne made a loop south of OPC's marine area and east of the Bahamas, the ship **Horizon Hawaii** (KIRF) reported a north wind of 40 kts on the outer fringe of Jeanne near 31N 69W at 0000 UTC September 23. Jeanne crossed central Florida on September 26 before turning northeast and weakening to a tropical depression inland over the southeast U.S. early on the 28th. At 1200 UTC September 28 the ship **OOCL Faith** (VRWG6) encountered south winds of 35 kts at 34N 76W near the North Carolina coast. After becoming an extratropical gale near the Delmarva Peninsula late on the 28th, the cyclone turned more east along 41N and passed south of Newfoundland on October 1, before turning more southeast and dissipating near the Azores early on October 6.

Hurricane Lisa: Lisa initially followed closely the track of Karl and entered the southeast high seas waters of OPC at the end of September as a tropical storm, then strengthened into a hurricane near 38N 45W at 2100 UTC October 1 with maximum sustained winds of 65 kts with gusts to 80 kts. Lisa then weakened to a tropical storm near 43N 35W late on October 2 and veered to the right of the track of Karl. Lisa then weakened to an extratropical gale near 45N 30W at 0600 UTC October 3, crossed the British Isles on the night of the 3rd, and then re-intensified into a large storm north of the British Isles after absorbing another low near Iceland on the 4th. The center developed a central pressure down to 968 hPa near 62N 8W at 1800 UTC on the 4th. The ship **Arina Arctica** (OVYA2) reported a north wind of 60 kts near 61N 13W at 1200 UTC on the 5th. The storm then weakened and moved east, passing south of Norway late on the 7th.

Subtropical Storm Nicole: Nicole developed from a non-tropical low near 32N 66W early on October 10. Maximum sustained winds were 40 kts with gusts to 50 kts. A subtropical storm has characteristics of both tropical and non-tropical lows, and maximum sustained winds of 34 kts or higher. Nicole then accelerated northward and slowly strengthened, with maximum sustained winds reaching 45 kts with gusts to 55 kts when the center crossed 40N 61W at 2100 UTC October 11. Near this time the **Teco Trader** (KSDF) (near 35N 61W) reported a south wind of 45 kts and 6.5 m seas (21 ft) at 1200 UTC

October 11, and six hours later the **Ville de Libra** (DNFA) (near 41N 56W) encountered southeast winds of 43 kts and 8.0 m seas (26 ft). The cyclone then merged with a polar front to the west and became an extratropical storm near 42N 63W late on the 11th. The **Ville de Libre** (DNFA) reported west winds of 40 kts and 8.5 m seas (28 ft) near 1800 UTC on the 12th. The highest wind reported from a ship was a 52 kts north wind from the vessel **Don Carlos** (SICN) near 41N 66W at 0000 UTC October 12. The Gulf of Maine buoy 44024 (42.3N 65.9W) reported a northwest wind of 37 kts and gusts to 49 kts along with 7.5 m seas (25 ft) at 0700 UTC October 12, the highest winds and seas reported from a buoy. The buoy Canadian 44142 (42.5N 64.0W) had a lowest pressure of 972.4 hPa at 1300 UTC on the 12th. The cyclone then moved north across the Canadian Maritimes as a gale on the 13th and reached the northern Labrador Sea on the 14th, before turning southeast and weakening on the 16th.

Tropical Storm Otto: Otto was the last tropical cyclone of the 2004 season, a late-season storm developing from a non-tropical system which moved north into OPC's high seas waters and stalled near 32N 51W, becoming a tropical storm late on November 30. Otto developed a maximum intensity of 45 kts sustained winds and gusts to 55 kts at 0900 UTC December before drifting southeast and beginning to weaken. The ship **Sabine** (V7BI3) (32N 53W) reported a northwest wind of 50 kts at 0600 UTC December 1. Otto moved south of 31N early on December 2 and weakened to an extratropical low later on the 2nd. Otto's remnant low appears in ***Figure 6*** near 26N 50W at 1800 UTC December 3.

Other Significant Events of the Period

North Atlantic Storm, September 15–17: A complex area of low pressure developed over the Canadian maritime provinces early on September 13 and moved northeast, passing south of Greenland on the 14th. The system formed a new center on a front west of Ireland as shown in ***Figure 2***, which moved north and rapidly intensified, absorbing the gale center to the northwest. The second part of ***Figure 2*** shows a mature hur-

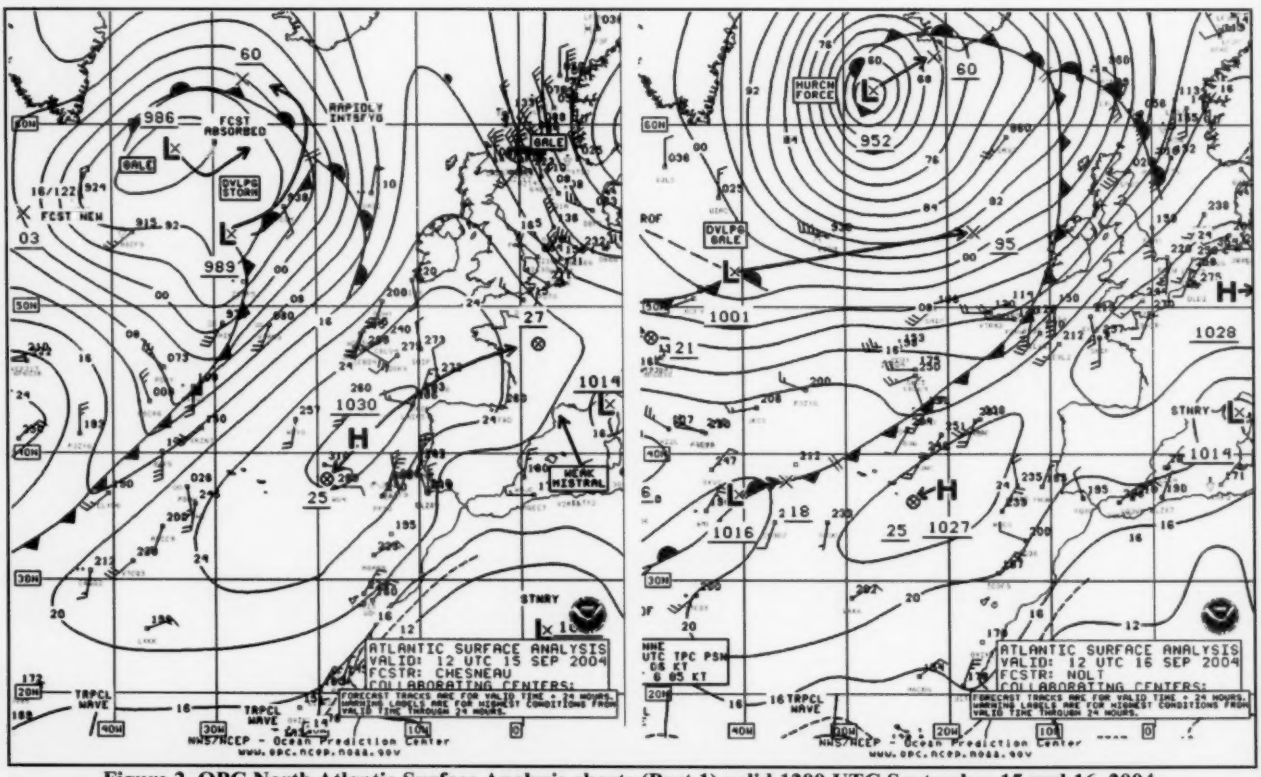


Figure 2. OPC North Atlantic Surface Analysis charts (Part 1) valid 1200 UTC September 15 and 16, 2004.

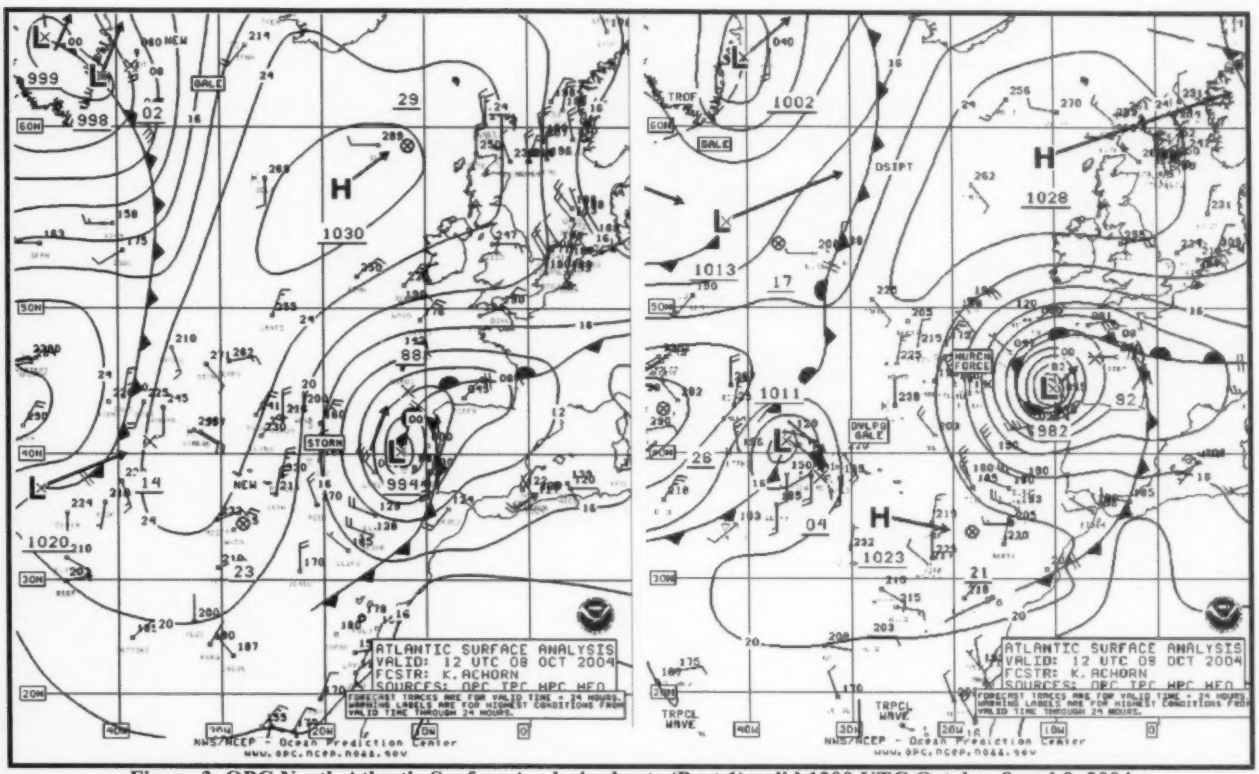


Figure 3. OPC North Atlantic Surface Analysis charts (Part 1) valid 1200 UTC October 8 and 9, 2004.

ricane-force low southwest of Iceland at maximum intensity. Although it was still late summer on the calendar, the storm developed a central pressure of 952 hPa, which was the second lowest of the period in the North Atlantic for non-tropical systems and comparable to the October 16–18 storm below, in terms of intensity. The storm then moved northeast past Iceland late on the 18th.

Storm near Europe, October 8–10: This slow-moving system formed west of Portugal early on October 8 and drifted north, blocked by high pressure to the north. The second part of ***Figure 3*** shows the storm at maximum intensity with hurricane-force winds. At 1200 UTC October 9 the **Punjab Senator** (DQVK) (near 44N 9W) encountered south winds of 65 kts, and the **Bretagne** (FNBR) near 51N 5W reported east winds of 55 kts. At the same time the ship **LNG Bayelsa** (ZCDF9) near 42N 10W reported southwest winds of 50 kts and 9.0 m seas (29 ft). The storm then drifted northeast and weakened over France on the 11th.

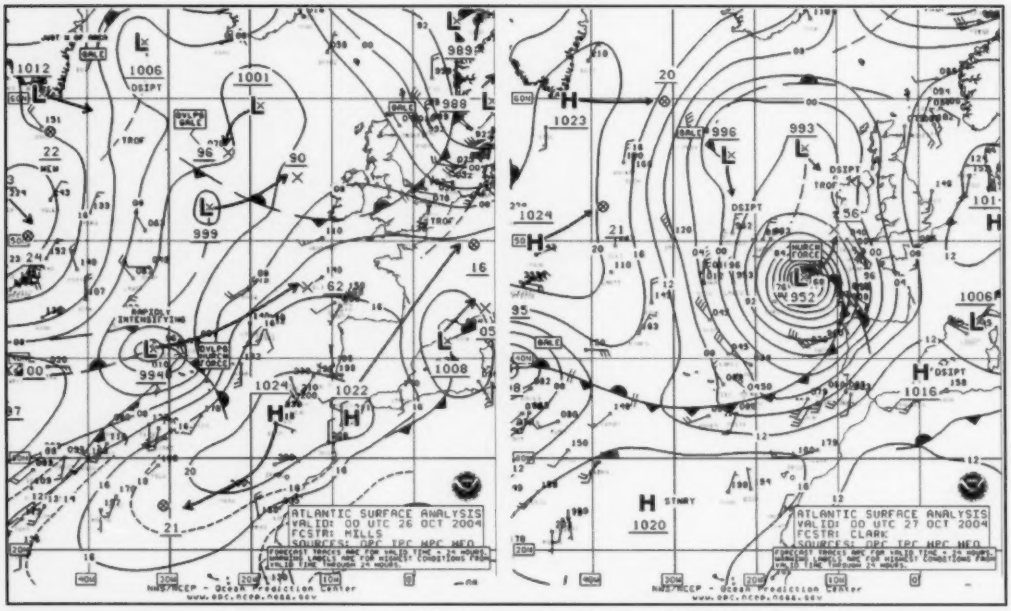


Figure 4. OPC North Atlantic Surface Analysis charts (Part 1) valid 0000 UTC October 26 and 27, 2004.

OBSERVATION	POSITION	DATE/TIME(UTC)	WIND (kts)	SEAS(m/ft)
Ernest Shackleton (ZDLS1)	46N 9W	27/0000	SE 65	
Heidelberg Express (DEDI)	47N 11W	27/1000	W 65	
Ernest Shackleton (ZDLS1)	44N 9W	27/1800	W 40	8.5/28
CGM Saint Exupery (ELVB6)	48N 7W	27/2300	SW 50	
Galveston Bay (WPKD)	47N 14W	28/1200	NW 40	10.7/35
SHIP	48N 17W	28/1800	NW 50	7.3/24
Buoy 62163	48N 9W	27/0900	S 35	7.6/25
Buoy 62029	49N 12W	27/1300	W 45	
Buoy 62163	48N 9W	27/1400	SW 40	11.0/36
Buoy 62565	54N 17W	28/0700	N 50	

Table 1. Some observations taken off the coast of Western Europe around the storm of October 26–28, 2004.

Eastern North Atlantic Storm of October 26–28: This storm had origins near the mid-Atlantic coast of the U.S. early on October 20. ***Figure 4*** shows this low off the left edge of the first part of the figure, but developing a secondary center near 41N 32W which tracked northeast while rapidly deepening. This was truly a meteorological "bomb," dropping 42 hPa in central pressure in the 24-hour period covered by ***Figure 4***. The central pressure bottomed out six hours later at 950 hPa at 0600 UTC on October 27, making the storm the deepest of the four-month period in the North Atlantic among non-tropical lows. ***Figure 5*** is a satellite image of the storm as it appeared four and one-half hours later, fully mature with frontal cloud bands wrapping all the way around the well-defined center (49N 10W), a broad comma-like feature, and cold (white on infrared imagery) cloud tops indicating that the system has great vertical extent. ***Table 1*** has selected ship and buoy reports around the storm. The storm subsequently drifted northeast and weakened to a gale late on the 28th near Ireland before turning southeast toward Spain and continuing to weaken.

North Atlantic Storm of December 3–7: This intense system originated as a frontal wave near the southeast coast of the U.S. late on December 2 and is depicted in ***Figure 6***. The central pressure fell 47 hPa during the 36-hour period covered by ***Figure 6***, during which it absorbed the low and front over the northeast U.S. and the

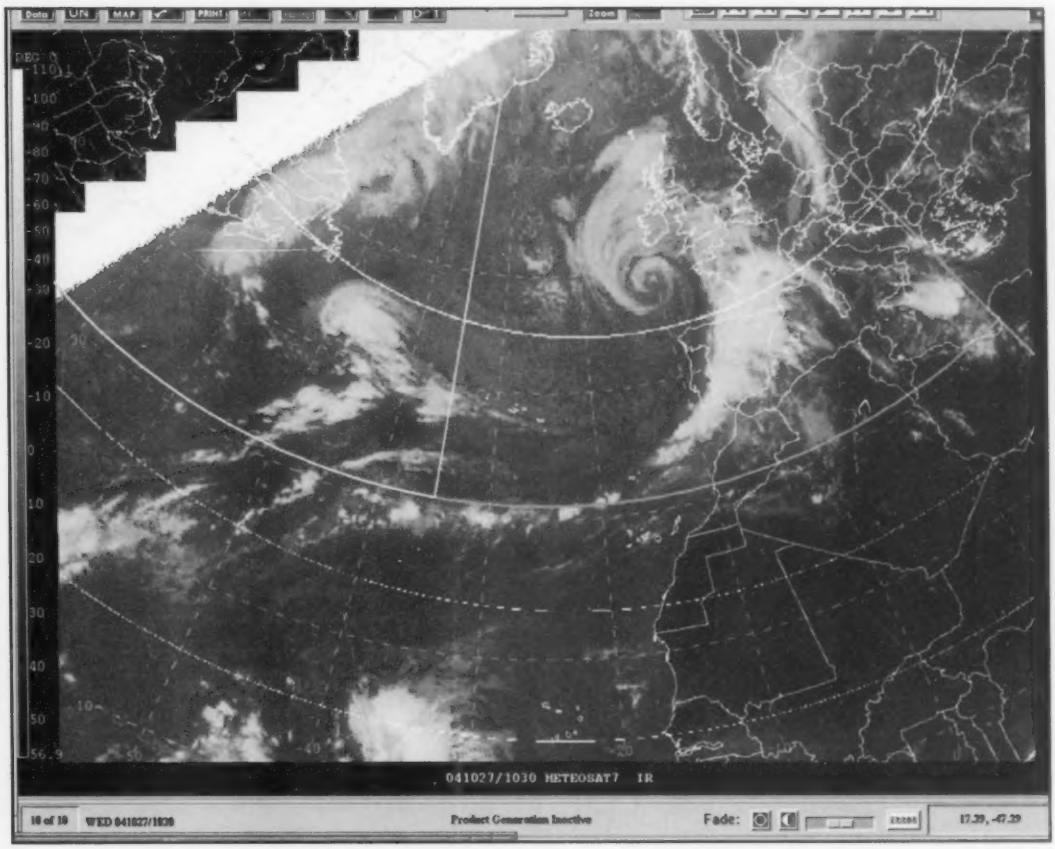


Figure 5. METEOSAT-7 infrared satellite image valid at 1030 UTC October 27, 2004. Satellite senses temperature on a scale from black (warm) to white (cold) in this type of imagery. The storm in *Figure 4* is shown near maximum intensity, with the time of the image ten and one-half hours later than the valid time of the second part of *Figure 4*.

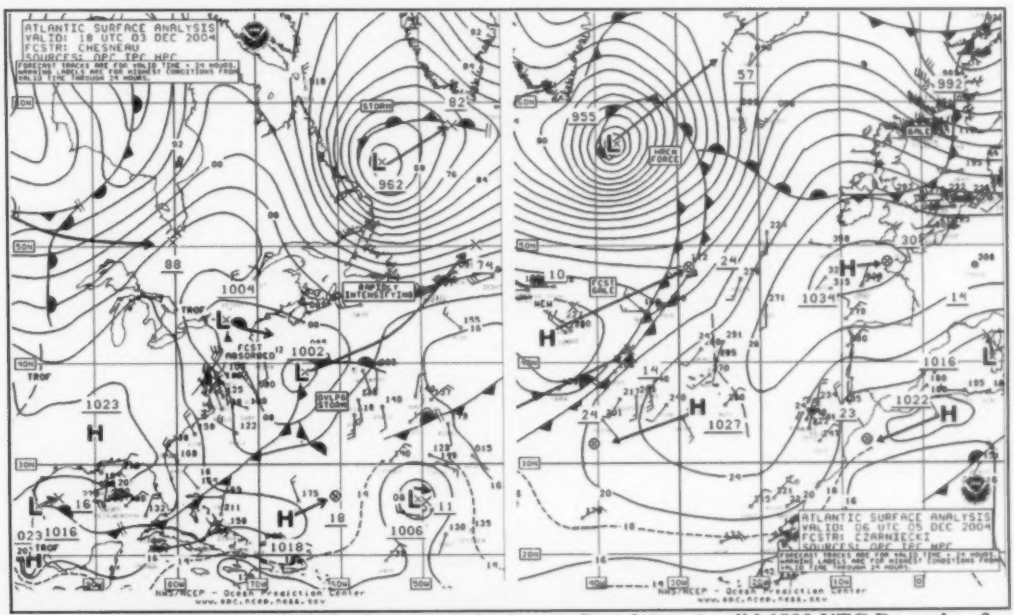


Figure 6. OPC North Atlantic Surface Analysis charts: Part 2 (west) valid 1800 UTC December 3 and Part 1 (east) valid 0600 UTC December 5, 2004.

962 hPa storm shown in the Labrador Sea in the first panel of the figure. The Grand Banks oil platforms reported northwest winds to 60 kts as the deepening storm passed nearby at 1200 UTC December 4. The storm moved into an area of sparse ship data, but the high-resolution QuikScat winds in ***Figure 7*** reveal numerous wind barbs in the 65 to 75 kts range south and east of the center. The data show a well-defined center at 58N 36W. The **Atlantic Peace** (DEOT) reported a north wind of 60 kts near 62N 40W near the Greenland coast at 1200 UTC on the 5th. The central pressure bottomed out at 954 hPa at that time, after which the system began to weaken and passed northeast of Iceland early on December 7.

Northwest Atlantic Storm of December 6–8: This storm immediately followed the storm described in the preceding paragraph but tracked farther north and was not as intense. It still produced hurricane-force winds. The cyclone moved from southern Labrador late on December 5 to 60N 40W at 1200 UTC December 7 with a 972 hPa central pressure. Platform (VEP717) in the Grand Banks reported a west wind of 65 kts at 0000 UTC on the 7th. The **Atlantic Peace** (DEOT) experienced northeast winds of 70 kts near 62N 41W at 1200 UTC December 7. The storm then moved northeast, passing northwest of Iceland late on the 8th.

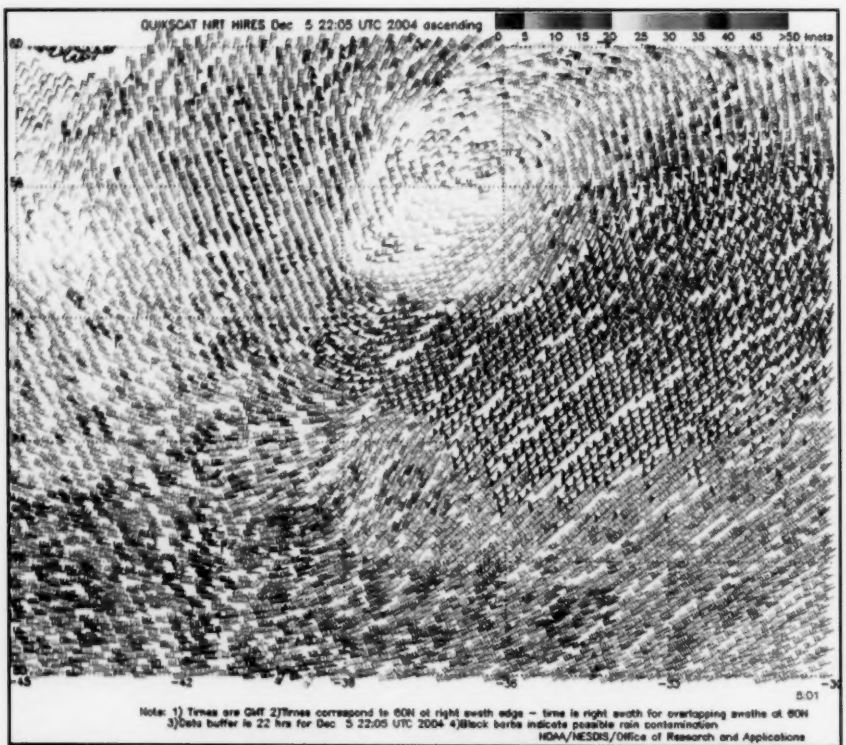


Figure 7. High-resolution QuikScat scatterometer image of satellite-sensed winds valid at about 0800 UTC December 5, 2004. The resolution of the image is 12.5 m, versus 25 km for the coarser-resolution version of the imagery. The valid time of the pass is only two hours later than the valid time of the second part of *Figure 6*.

Image is courtesy of NOAA/NESDIS/Office of Research and Applications.

North Atlantic Storm of December 13-14: This storm developed from a frontal wave which moved northeast from the Canadian Maritimes on December 12, and is shown in the first part of ***Figure 8*** southeast of Greenland. The system moved rapidly northeast to become a hurricane-force storm while passing east of Iceland early on the 14th (second part of ***Figure 8***). The **Irena Arctica** (OXTS2) (near 62N 11W) reported west winds of 70 kts as the storm center passed to the north at 0600 UTC December 14. To the northwest, the ship **Helgafell** (MYCF3) near 63N 14W encountered west winds of 55 kts at that time. The storm then passed rapidly northeast of Iceland shortly thereafter.

North Atlantic Storm of December 14–16: This storm followed a track similar to that of the December 13–14 event and similarly affected mainly the far northern waters. The system developed hurricane-force winds after passing 30W at 1200 UTC on the 15th, then reached maximum intensity (960 hPa) near 61N 26W six hours later. While the storm was passing north of the British Isles at 1200 UTC on the 16th, the ocean station **Minna** (MASH6) at 57N 6W reported west winds of 70 kts. The system then weakened to a gale while passing northwest of Norway on December 17.

North Atlantic Storm of December 26-29: This final significant event could be considered the climax of the four-month period. Its initial development is depicted in ***Figure 9***. This system affected a large area of the western and northern Atlantic waters with warning conditions, and maintained hurricane-force strength far longer than any other storm in this period, more than 36 hours beginning early on the 27th. The central pressure

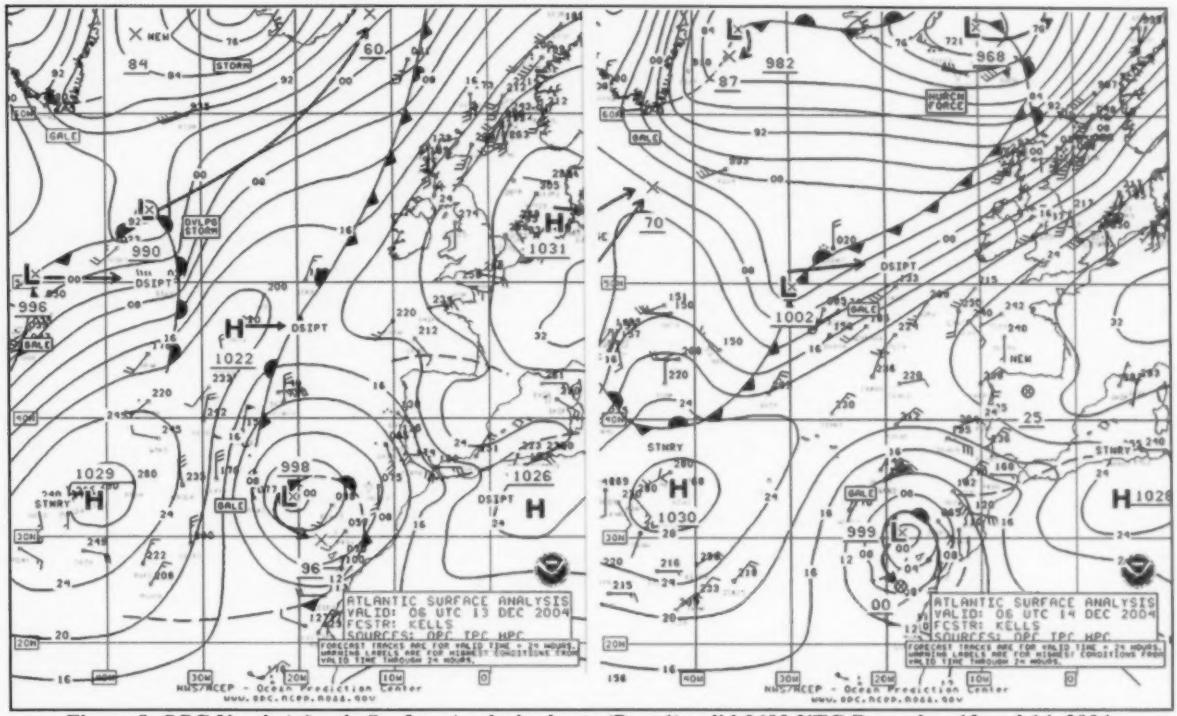


Figure 8. OPC North Atlantic Surface Analysis charts (Part 1) valid 0600 UTC December 13 and 14, 2004.

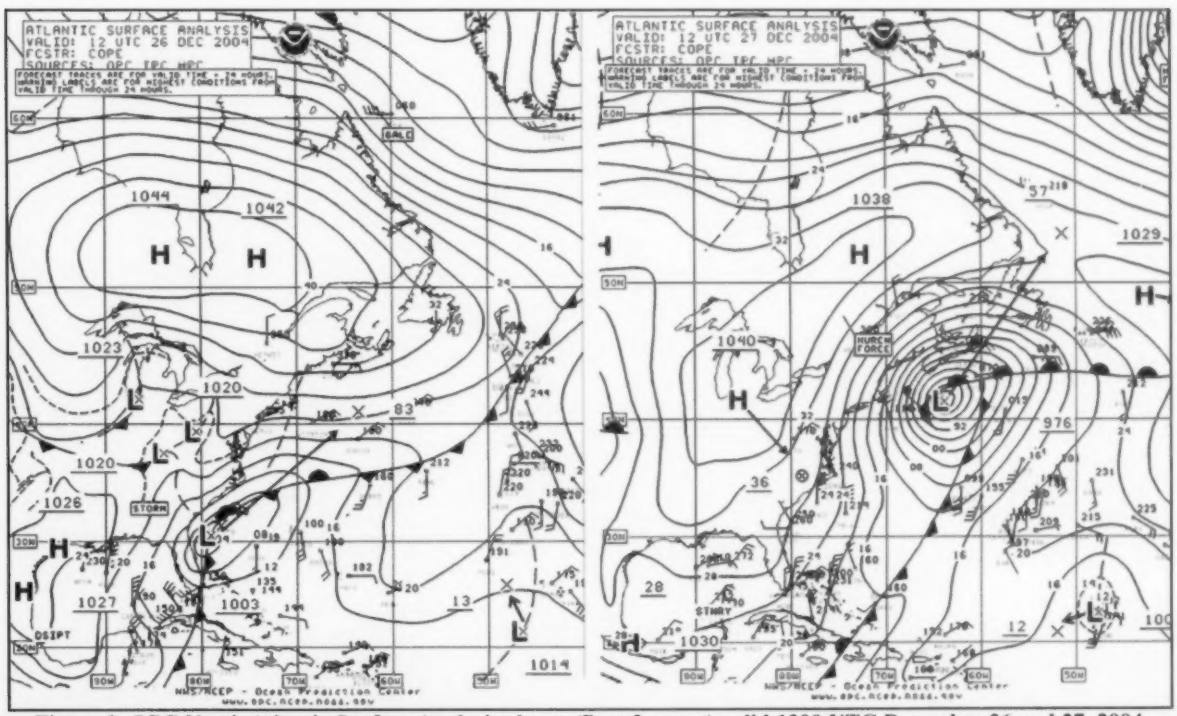


Figure 9. OPC North Atlantic Surface Analysis charts (Part 2 - west) valid 1200 UTC December 26 and 27, 2004.

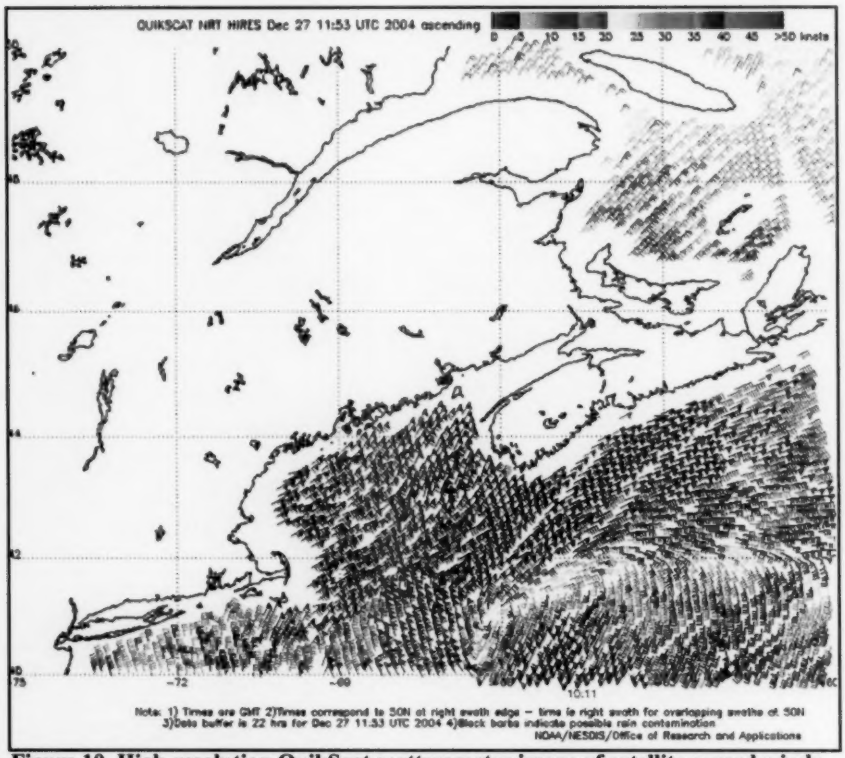


Figure 10. High-resolution QuikScat scatterometer image of satellite-sensed winds valid at 1011 UTC December 27, 2004. The valid time of the pass is about two hours prior to the valid time of the second analysis in *Figure 9*.

Image is courtesy of NOAA/NESDIS/Office of Research and Applications.

dropped 27 hPa in the initial twenty-four hour period of rapid deepening shown in ***Figure 9***. The high-resolution QuikScat image of ***Figure 10*** shows a large area of winds in the 60 to 80 kts range affecting the waters east of New England and south of Nova Scotia. Some conventional surface observations taken during the storm are listed in ***Table 2***.

The storm center crossed the island of Newfoundland on the evening of the 27th and then continued on a north-northeast track, developing a lowest central pressure of 955 hPa while passing between Greenland and Iceland at 0600 UTC December 29. The system then passed north of Iceland shortly thereafter.

Table 2. Selected ship, buoy and C/MAN reports taken during the storm of December 26-29, 2005.

OBSERVATION	POSITION	DATE/TIME(UTC)	WIND (kts)	SEAS(m/ft)
APL Beijing (A8FL7)	43N 61W	27/1200	E 65	
Geysir (WCZ5528)	41N 64W	27/1200	NW 60	
Finnwood (SJEI)	45N 58W	28/0000	SW 70	
Buoy 44004	38.5N 70.5W	27/0300	NW 45 G54	7.0/23
		27/0400	Peak gust 62	
Buoy 44008	40.5N 69.4W	27/0700	N 45 G54 P	9.0/30
		27/0800	eak gust 60	
Buoy 44011	41.1N 66.6W	27/1200	NW 52 G68	8.5/28
		27/1200	Peak gust 72	10.0/33
		27/1400		
Buoy 44137	42.3N 62.0W	27/1600	SW 56 G 72	10.5/34
		27/1700		11.5/38
Buoy 44142	42.5N 64.0W	27/0800	NE 49 G62	9.0/30
		27/0900		10.0/33
Buoy 44139	44N 57W	28/0100	SW 45	12.8/42
Mount Desert C/MAN	44N 68W	27/110	N 51 G57 Peak gust 61	

Marine Weather Review—North Pacific Area September through December 2004

By George P. Bancroft, NOAA National Center for Environmental Prediction

Introduction

This period includes the fall season when western North Pacific tropical cyclones were relatively active. Most of these passed near, over or south of Japan prior to becoming extratropical or dissipating. Only one of them appeared after October.

Extratropical storm activity picked up late in October, and the November to December period was particularly active, with hurricane-force storms concentrated during those months. Due to the sheer number of storms, the focus in this article is on hurricane-force storms, labeled as such by OPC surface analysts on the basis of QuikScat and other satellite imagery, surface observations, model guidance and trends.

Tropical Activity

Typhoon Songda: At the start of September, Typhoon Songda was near 18N 146E with maximum sustained winds of 125 kts with gusts to 150 kts. It maintained intensities in the range of 105 to 125 kts sustained winds through September 3, when the typhoon passed about 700 nmi south of Japan. While the typhoon was making the turn to the north out near 130E from September 3 through early on the 5th, several ships reported near the path of the storm and are included in a list of ship reports in ***Table 1***. Songda then turned northeast into the Sea of Japan and re-appeared on The Ocean Prediction Center's (OPC's) radiofacsimile analysis charts near 39N 136E at 1200 UTC September 7 with maximum sustained winds of 70 kts with gusts to 85 kts. It weakened

OBSERVATION	POSITION	DATE/TIME(UTC)	WIND (kts)	SEAS(m/ft)
Northwest Sandpiper (VNVG)	25N 130E	03/1200	NW 75	
	27N 131E	04/0000	NE 90	9.5/31
Bishu Maru (JGAC)	25N 133E	04/0000	E 65	8.5/28
Bishu Maru (JGAC)	25N 133E	04/0900	SE 50	12.5/41
Mokihana (WNRD)	26N 134E	04/1800	SE 45	9.5/31
Bishu Maru (JGAC)	24N 133E	04/2100	S 55	10.4/34
Mokihana (WNRD)	29N 133E	05/0600	E 35	9.0/30
LNG Leo (V7BX2)	29N 130E	05/0900	E 65	6.5/21
LNG Leo (V7BX2)	28N 130E	05/1200	NE 55	10.7/35
LNG Leo (V7BX2)	27N 130E	06/0800	S 55	
Leverkusen Express (DEHY)	31N 134E	06/1800	S 50	
Mignon (SJCD)	33N 134E	07/0000	S 35	9.0/30
Name Unknown (9MXFC)	32N 136E	07/0600	S 45	
Name Unknown (JHQP)	45N 148E	08/0600	S 45	

Table 1. Some ship observations taken during passage of Tropical Cyclone Songda including one taken after Songda became extratropical *Name Unknown* (JHQP).

to a tropical storm six hours later. ***Figure 1*** shows Songda merging with a non-tropical low and frontal system in the Sea of Japan and re-intensifying as an extratropical storm over a twelve hour period. Songda was most intense as an extratropical storm at 1200 UTC on the 8th when the central pressure was 967 hPa. The cyclone then began to weaken as it passed through the Sea of Okhotsk and later turned east into the Bering Sea on September 9 as a gale. Late on the 11th, the system entered the southern Gulf of Alaska while continuing to weaken before moving inland late on September 13.

Tropical Storm Sarika: Tropical Depression 23W formed near 17N 150E at 1800 UTC September 4, became Tropical Storm Sarika six hours later while moving northwest, and then intensified to just short of typhoon intensity near 20N 140E at 1200 UTC September 6. Maximum sustained winds reached 60 kts along with gusts to 75 kts. Sarika then began weakening and turned north toward Japan, but dissipated late on the 7th. The first part of ***Figure 1*** shows dissipating Tropical Depression Sarika 600 nmi south of Japan.

Typhoon Meari: Meari entered OPC's oceanic analysis area about 1,100 nmi south of Tokyo early on September 22 as a minimal typhoon with maximum winds 65 kts with gusts to 80 kts. By 1800 UTC on the 23rd, Meari developed maximum sustained winds of 105 kts with gusts to 130 kts near 19N 135E and turned more westward, passing west of OPC's analysis area on the 24th.

Typhoon Ma-On: With maximum sustained winds of 125 kts with gusts to 150 kts, as of 1800 UTC October 7, Typhoon Ma-On appears near the lower left corner of the satellite image of ***Figure 3*** with a well-defined eye. The cyclone tracked northeast and weakened, passing near Tokyo at 0600 UTC October 9 with maximum winds 90 Kt with gusts to 110 kts. The **Yahagi Maru** (JPAZ) reported northeast winds of 45 kts and 10.0 m seas (32 ft) near 33N 136E at 0600 UTC October 8. The cyclone then weakened rapidly over cooler water and dissipated after crossing 40N by 0000 UTC on the 10th.

Typhoon Tokage: Tropical Storm Tokage was named south of OPC's radiofacsimile chart area, well south of Japan, late on October 12 and tracked northwest, passing across 16N

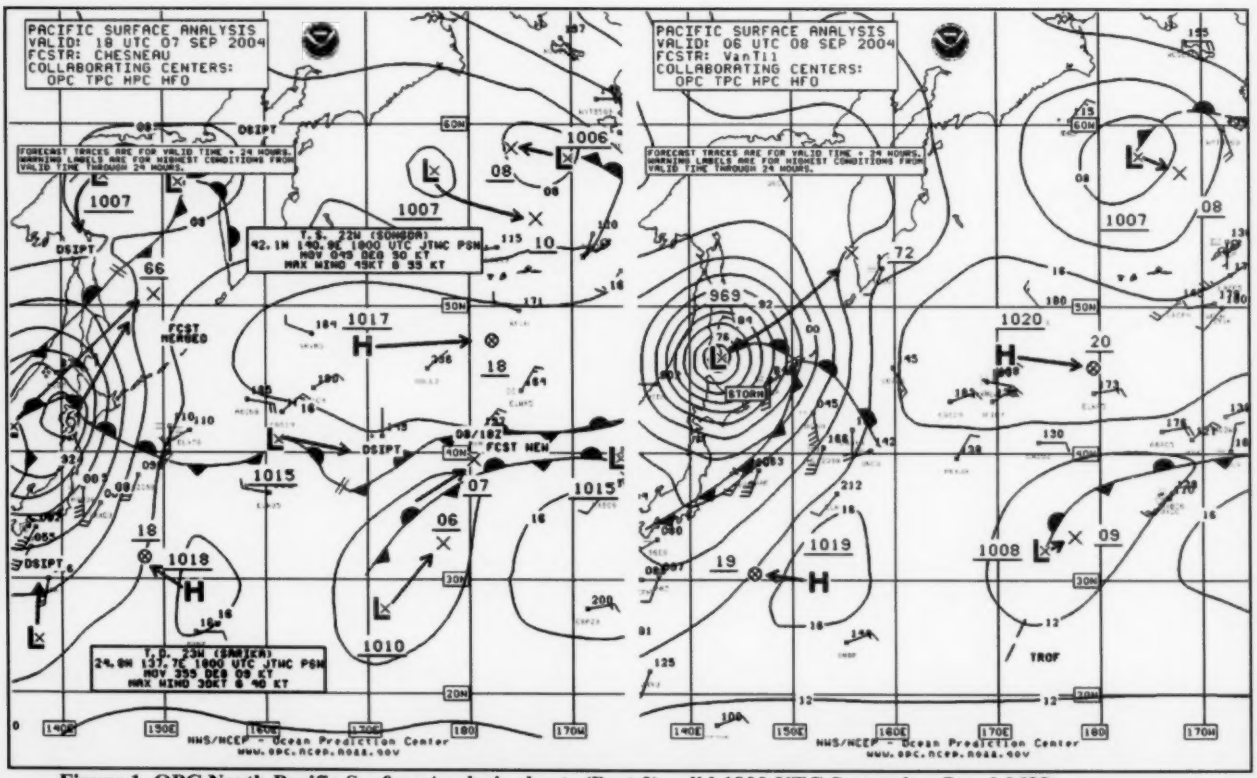


Figure 1. OPC North Pacific Surface Analysis charts (Part 2) valid 1800 UTC September 7 and 0600 UTC September 8, 2004. Tropical Storm Songda is depicted becoming an extratropical storm.

135E at 1800 UTC on the 15th as a typhoon with maximum sustained winds 100 kts with gusts to 125 kts. Tokage then recurved toward Japan, weakening to a tropical storm near 31N 132E at 0000 UTC October 20 with maximum winds 60 kts with gusts to 75 kts.

By 1200 UTC that day Tokage was over Japan's main island of Honshu near 36N 137E with maximum sustained winds 40 kts with gusts to 50 kts. The weakening tropical storm produced some impressive seas south of Japan as indicated in ***Table* 2**. Tokage then crossed northern Honshu as a tropical depression before becoming an extratropical storm near 43N 154E by 1200 UTC on the 21st. After reaching the central Bering Sea late on October 22, the remains of Tokage re-intensified near the southwest mainland Alaska coast early on the 23rd with central pressure down to 972 hPa. Then, the storm reformed in the northern Gulf of Alaska early on the 24th, before dropping southeast to the Oregon coast of the U.S. on October 26, where it weakened. During the extratropical phase of Tokage's existence the strongest wind reported by a ship was a south wind of 55 kts from **Westwood Victoria** (C6SI6) near 41N 163E at 0000 UTC October 22.

Typhoon Nock-Ten: Typhoon Nock-Ten made a brief appearance on the OPC North Pacific surface analysis near 16N 135E at 1200 UTC October 22 while on a northwestward track west of the area. Maximum sustained winds were 100 kts with gusts to 125 kts.

Tropical Storm Noru: The last tropical cyclone of the period moved into OPC's North Pacific chart area as Noru, near 16N 146E at 1800 UTC December 19 with maximum sustained winds of 50 kts with gusts to 65 kts. Unlike any of the other tropical systems of the four-month period through December, Noru moved first northeast and then turned east, and became an extratropical gale near 27N 167E by the 22nd, briefly a storm late on the 23rd near 26N 175W, and then turned more north near 170W. Noru later redeveloped as a storm in the Gulf of Alaska on December 28 before dropping southeast and weakening over the U.S. Pacific Northwest on the 31st.

Other Significant Events

Twin Hurricane-Force Storms, October 6–9: These were the first non-tropical hurricane-force storms of the period, occurring simultaneously. The eastern system rapidly intensified from a 1008 hPa low near 43N 169W to a 962 hPa hurricane-force storm near 48N 143W in the twenty-four hour period ending at 1200 UTC October 7—a drop of 46 hPa (almost 2 hPa per hour). OPC classified it as hurricane force from 0600 UTC on the 7th through 0000 UTC on the 8th. The lowest central pressure was 957 hPa at 1800 UTC on the 7th when the center was at 49N 141W. The cyclone weakened rapidly beginning later on the 8th while drifting northeast and dissipated near the coast of British Columbia late on the 9th. The western system developed from a 993 hPa low near 40N 148E at 0600 UTC October 6 which moved northeast. The central pressure dropped 28 hPa in the twenty-four hour period ending at 1200 UTC on the 7th, when the cyclone became a hurricane-force storm near 53N 168E with the center at 962 hPa. The central pressure was as low as 955 hPa when the center was in the Bering Sea near 57N 179W at 1800

OBSERVATION	POSITION	DATE/TIME(UTC)	WIND (kts)	SEAS(m/ft)
Paris Express (DIHE)	31N 135E	20/0000	SE 50	8.2/27
Paris Express (DIHE)	30N 135E	20/0300	S 55	13.5/44
Paris Express (DIHE)	30N 135E	20/0600	SW 50	17.0/56
LNG Leo (V7BX2)	32N 138E	20/1200	S 50	10.7/35
Gallina (9VGC4)	34N 138E	20/1200	SW 60	11.5/38
Mare Internum (V2CP)	38N 152E	20/1800	S 35	8.5/28
LNG Leo (V7BX2)	33N 137E	20/1800	W 50	
Oriente Shine (H9AL)	35N 145E	21/0000	S 40	6.7/22
Buoy 21600	34.6N 137.9E	20/1500	10.7/35	

Table 2. Ship and buoy observations taken during passage of Tropical Cyclone Tokage.

UTC October 8. The low was labeled as hurricane-force by OPC from 1200 UTC on the 7th through 0600 UTC on the 8th. Weakening followed, with the system becoming a gale in the eastern Bering Sea late on the 9th, and then becoming absorbed by another large gale to the south on the 11th. ***Figure 2*** shows the two storms fully developed. ***Figure 3*** is a satellite image valid shortly thereafter, featuring frontal cloud bands wrapping around well-defined centers, broad comma-like cloud features and high(cold) cloud tops. The valid time of the QuikScat image of ***Figure 4*** is close to that of ***Figure 2*** and shows swaths of 50 to 65 kts wind barbs on the south side of the center and also to the north, and even some 70 kts observations to the northeast. Similar data was available for the eastern system (not shown) and showed similar winds around the south and southwest sides of the center. ***Table 3*** lists some ship and buoy observations around the two storms.

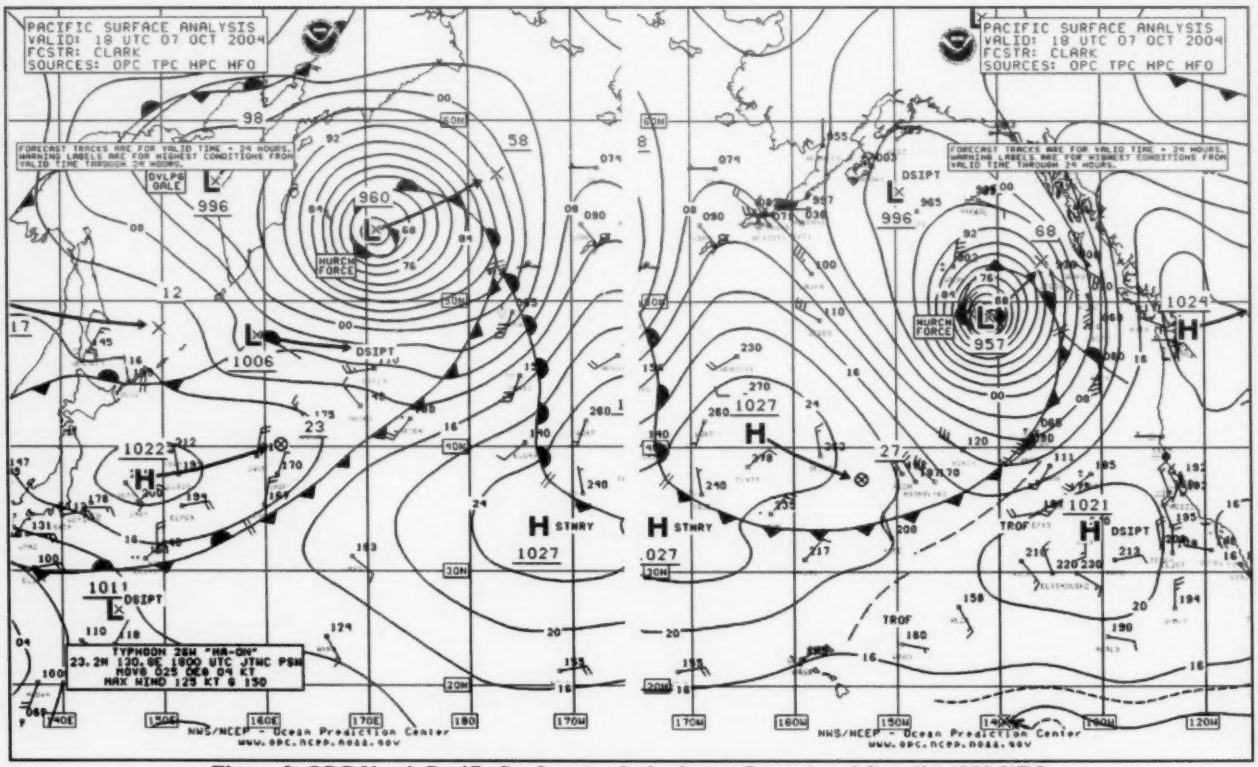


Figure 2. OPC North Pacific Surface Analysis charts (Parts 1 and 2) valid 1800 UTC October 7, 2004. Twin hurricane-force storms are shown near maximum intensity.

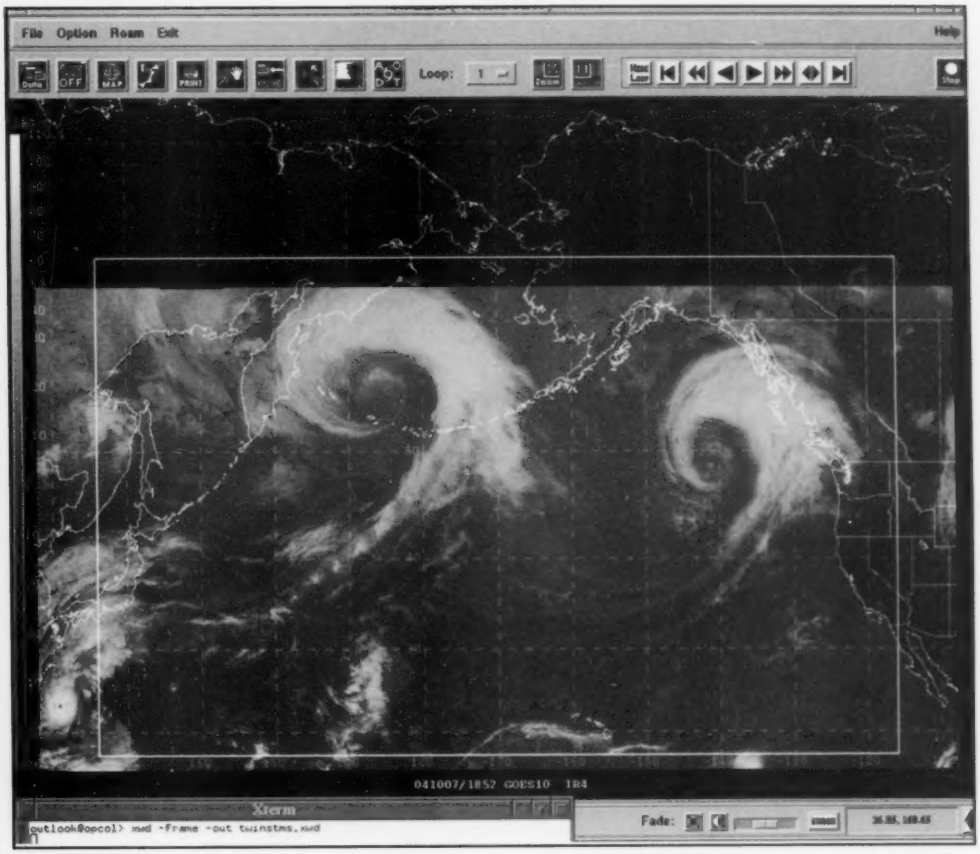


Figure 3. Mosaic of GOES infrared satellite imagery covering the North Pacific valid at 1930 UTC October 7, 2004. Satellite senses temperature on a scale from black (warm) to white (cold) in this type of image. The time of the image is only one and one-half hours later than the valid time of *Figure 2*.

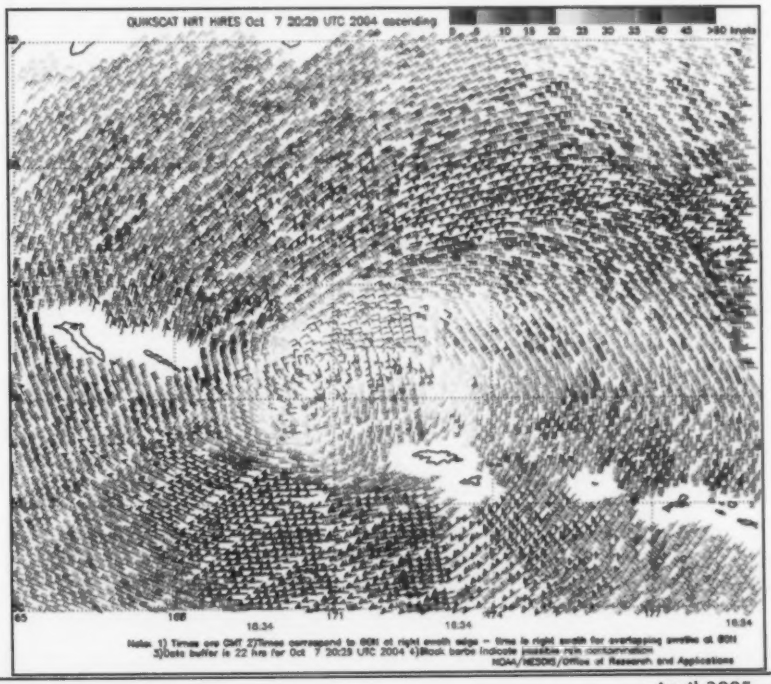


Figure 4. High-resolution QuikScat scatterometer image of sattelite-sensed winds valid about 1834 UTC October 7, 2004, close to the valid time of *Figure 2*. The resolution is 12.4 km, versus the 25 km resolution of regular QuikScat imagery.

Image is courtesy of NOAA/NESDIS/Office of Research and Applications

OBSERVATION	POSITION	DATE/TIME(UTC)	WIND (kts)	SEAS(m/ft)
Horizon Enterprise (KRGB)	49N 145W	07/1200	N 60	
Horizon Enterprise (KRGB)	47N 137W	08/0400	SW 55	
Horizon Anchorage (KGTX)	50N 129W	08/0100	SE 40	9.0/30
Horizon Anchorage (KGTX)	52N 133W	08/1200	S 45	10.5/34
Buoy 46004	51N 136W	08/0200	S 35	10.0/32
Buoy 46036	48N 134W	08/0200	SW 35	8.5/28
Pilsum (A8DO8)	48N 158E	07/0000	NW 60	
President Adams (WRYW)	49N 176W	07/1800	S 40	9.5/31
Swift Arrow (C6NI7)	52N 178W	08/0600	SW 50	
Swift Arrow (C6NI7)	51N 180W	09/0000	W 50	
Buoy 46035	57N 177W	07/2200	SE 45	5.0/16
Buoy 46035	57N 177W	08/0000	SE 35	5.2/17
Buoy 46071	51N 179E	08/0700	SW 50	

Table 3. Ship and buoy observations taken around the two storms of October 6–9.

Northwestern Pacific and Bering Sea Storm of November 15–19: This system moved east from Sakhalin Island already with a 972 hPa center at 1200 UTC on November 15 and intensified to 956 hPa twenty-four hours later when the center was at 52N 154E. The low was briefly classified by OPC as a hurricane-force storm from 0000 to 0600 UTC on the 16th. At 1200 UTC November 16, the ships **Hanjin Praha** (A8CP5) (49N 155E) and **Zim Italia** (4XGT) (52N 159E) both reported southwest winds of 55 kts. Six hours later, **Hanjin Praha** (A8CP5) reported a west wind of 55 kts at 48N 153E. The storm entered the Bering Sea early on the 17th and slowly weakened. It was absorbed by another storm coming into the eastern Bering Sea from the south on the 19th.

Eastern North Pacific Storm of November 17–18: This hurricane-force storm developed rapidly from a frontal wave of low pressure, as depicted in ***Figure 5***. The system deepened 26 hPa in only 12 hours, resulting in the compact hurricane-force storm, shown in the second part of ***Figure 5***. The low was deepest at that time with the center at 990 hPa. The **Horizon Kodiak** (KGTZ) encountered northeast winds of 55 kts near 51N 130W at 0600 UTC November 17. The high-resolution QuikScat image in ***Figure 6*** reveals a swath of west to northwest winds in the 50 to 65 kts range around the southwest side of the storm center, which is just off the chart at 50N 131W. The storm quickly moved inland and weakened on the 18th. This was followed by a similar storm at the end of the month, described in the next section.

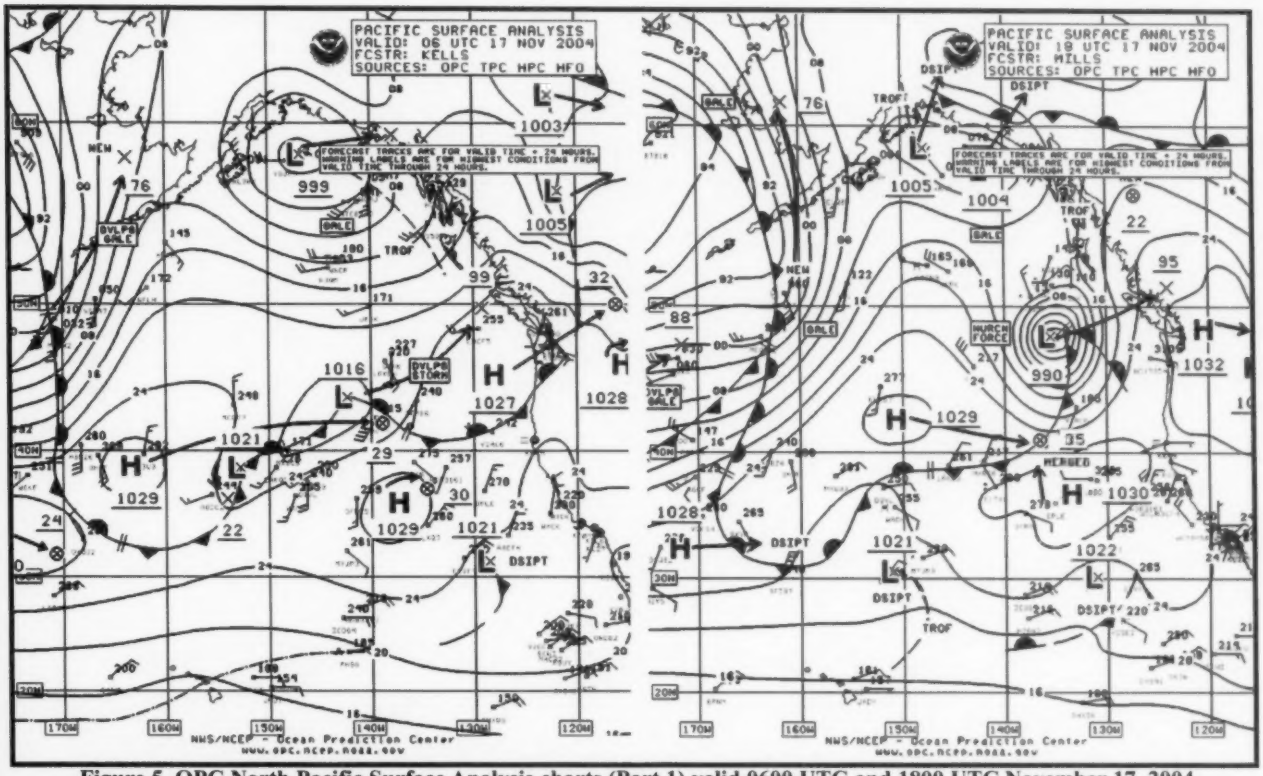


Figure 5. OPC North Pacific Surface Analysis charts (Part 1) valid 0600 UTC and 1800 UTC November 17, 2004

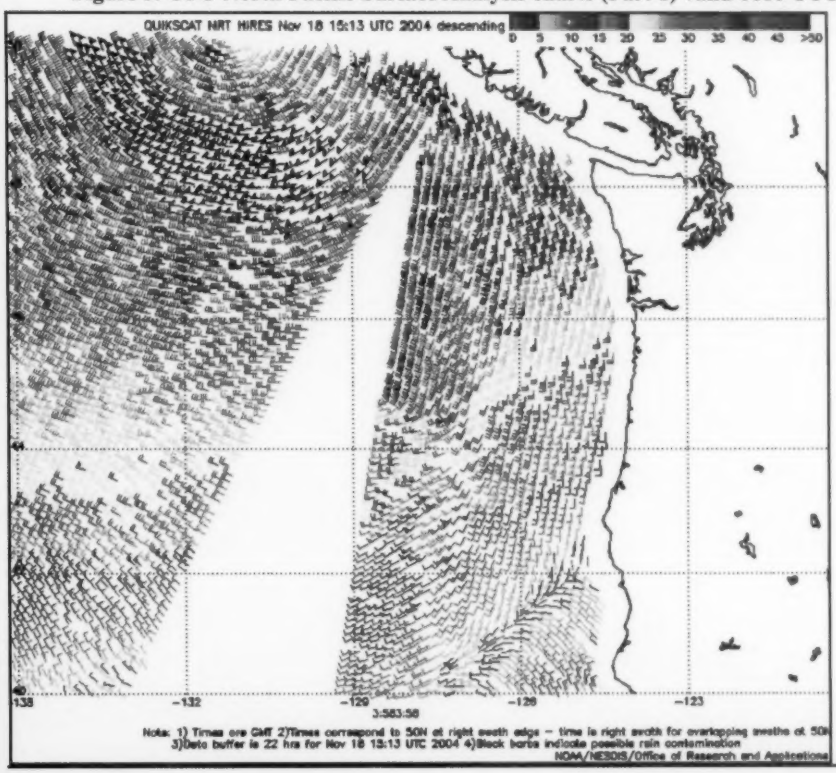


Figure 6. High-resolution QuikScat scatterometer image of satellite-sensed winds around the south side of the storm shown in *Figure 5*. The valid time of the pass is approximately 0400 UTC November 18, 2004, or about ten hours later than the valid time of the second part of *Figure 5*.

Image is courtesy of NOAA/NESDIS/Office of Research and Applications

North Pacific and Bering Sea Storms, November 20–25: The first of two storms described here followed a preceding storm (on the 19th) into the eastern Bering Sea on November 21 (the 962 hPa low in the first part of ***Figure 7***). It came from south of the Kamchatka Peninsula late on the 19th, initially deepening by 24 hPa in the twenty-four hour period ending at 0600 UTC on the 21st. The central pressure bottomed out at 954 hPa when the center was at 57N 171W at 1800 UTC November 21. The **Zim U.S.A.** (4XFO) reported a south wind of 80 kts near Dutch Harbor at 1200 UTC on the 21st (***Figure 7***). Other reports from ships and buoys for this storm and the one to follow are shown in ***Table 4***. The storm center then moved north of the Bering Sea on the 22nd. The development of the second storm to follow is shown in ***Figure 7***, with the center developing a lowest pressure of 953 hPa in the southern Bering Sea, where the system slowed. The central pressure fell 41 hPa in the thirty-six hours ending at 0000 UTC November 23. There were no ship or buoy observations with hurricane-force winds with this storm, but the QuikScat image in ***Figure 8*** reveals winds to 65 kts on the southwest side of the center, still just southwest of the central Aleutians at that time. The storm then moved slowly northeast and weakened to a gale early on the 24th, before weakening over Alaska by the 25th.

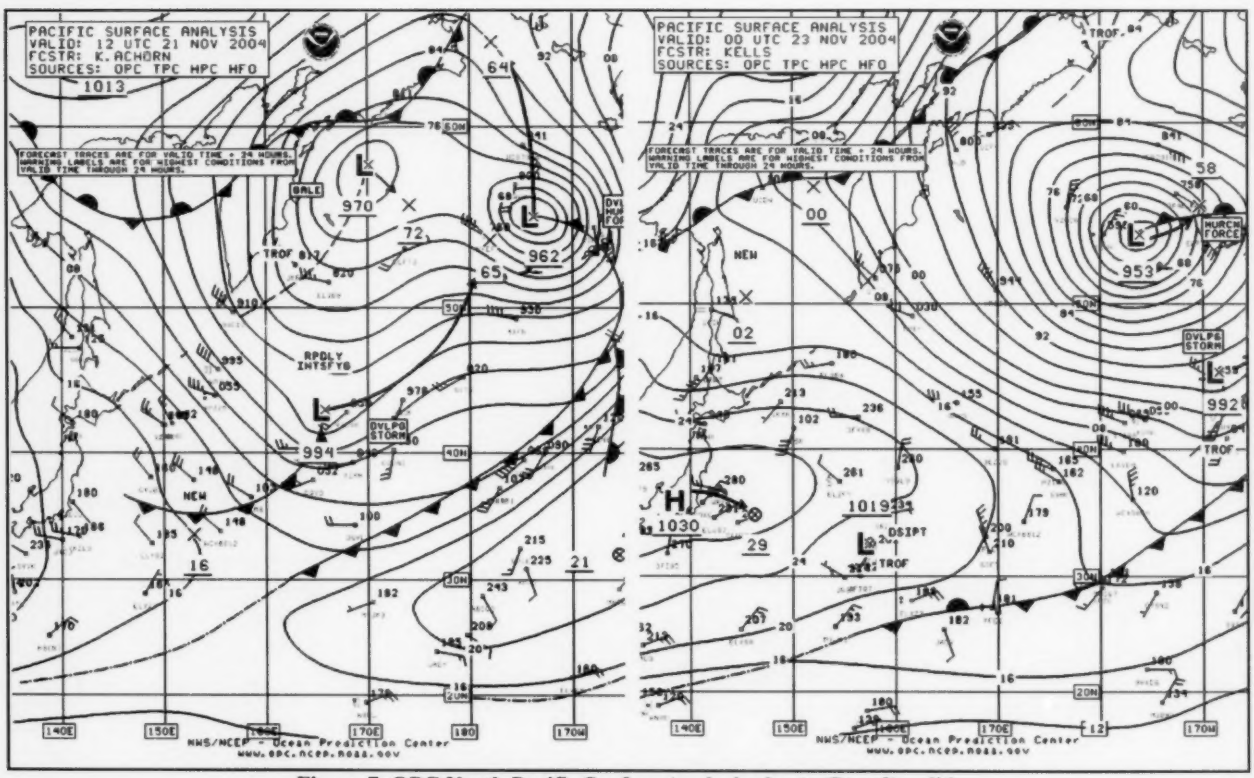


Figure 7. OPC North Pacific Surface Analysis charts (Part 2) valid 1200 UTC November 21 and 0000 UTC November 23, 2004.

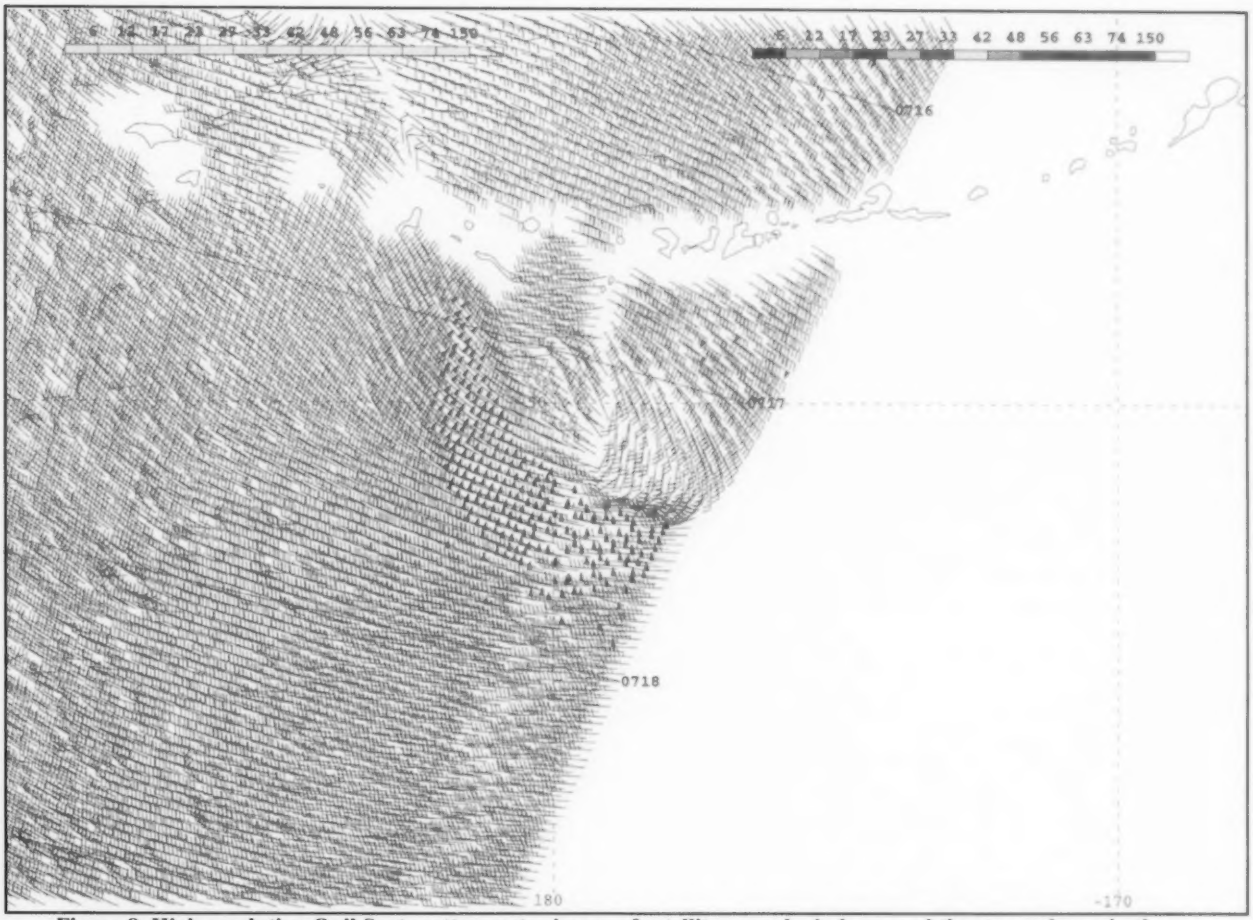


Figure 8. High-resolution QuikScat scatterometer image of satellite-sensed winds around the storm shown in the second part of *Figure 7*. The valid time of the pass is 0718 UTC November 22, 2004, or about seventeen hours prior to the valid time of the second part of *Figure 7*. The numbered diagonal lines are cross-track time lines.

Image is courtesy of NOAA/NESDIS/Office of Research and Applications

OBSERVATION	POSITION	DATE/TIME(UTC)	WIND (kts)	SEAS(m/ft)
Levant Weser (V2AC6)	55N 168W	21/1200	S 52	
Levant Weser (V2AC6)	55N 169W	21/1800	SW 60	
Signet Courageous (WDB7918)	59N 174W	22/0200	W 65	
Buoy 46072	51.6N 172.2W	21/0900	SW 43 G64	8.5/28
Buoy 46072	51.6N 172.2W	21/1200	SW 40	9.0/30
SeaLand Explorer (WGJF)	44N 178W	22/0600	SW 35	10.7/35
Polar Eagle (ELPT3)	54N 174W	22/1500	SE 50	
	54N 173W	22/1700	SE 55	
Buoy 46072	51.6N 172.2W	22/1900	S 35	9.5/31
Buoy 46071	51N 179E	22/1300	NW 40	6.0/20

Table 4. Selected ship and buoy observations taken in the two storms of November 20-25.

Western North Pacific Storm of November 26–29: Initially a storm when entering the Sea of Japan, this system deepened explosively in the following twenty-four hour period as shown in ***Figure 9***, resulting in the deepest storm of the period in both oceans (946 hPa or 27.94 in). The pressure drop in twenty-four hours was an impressive 41 hPa. At 0000 UTC on the 28th the **Swift Arrow** (C6NI7) near 48N 158E reported west winds of 65 kts. Six hours later the **Santa Giuliana** (ELYR2) experienced northwest winds of 60 kts and 15.0 m seas (49 ft). The storm subsequently began to weaken while moving into the Bering Sea later on the 28th, where it weakened further to gale strength by November 30.

Eastern North Pacific Storm, December 28–29: This storm's strength and motion were similar to the November 17–18 event, except a bit farther north. The center deepened by 14 hPa while moving from 48N 143W to 53N 137W in the twelve hour period ending at 0600 UTC November 29. The lowest central pressure was 994 hPa when the center was at 53N 137W at 0600 UTC on the 29th. Like the November 17–18 storm, this storm was compact with QuikScat winds similar to the data found in ***Figure 6***. The ship **Polar California** (WMCV) near 51N 135W reported a northwest wind of 50 kts at 1800 UTC November 29. The Canadian buoy 46004 (50.9N 136.1W) at 0800 UTC on the 29th reported a maximum wind of 41 kts with gusts to 54 kts, from the west, and 7.5 m seas (25 ft). Maximum seas were 8.5 m (28 ft) three hours later, at this buoy. The Canadian buoy 46208 (52.5N 132.7W) reported southeast winds up to 35 kts and gusts to 49 kts along with seas 4.5 m (15 ft) at 0700 UTC November 29. Maximum seas were 8.0 m (26 ft) at 1200 UTC on the 29th. The storm weakened near the coast late on the 29th.

North Pacific Storm, December 1–2: This system formed well south of the western Aleutians late on November 30 and moved rapidly northeast. It became deepest near 50N 166W with the central pressure at 970 hPa at 0000 UTC December 2, after dropping 26 hPa in twenty-four hours.

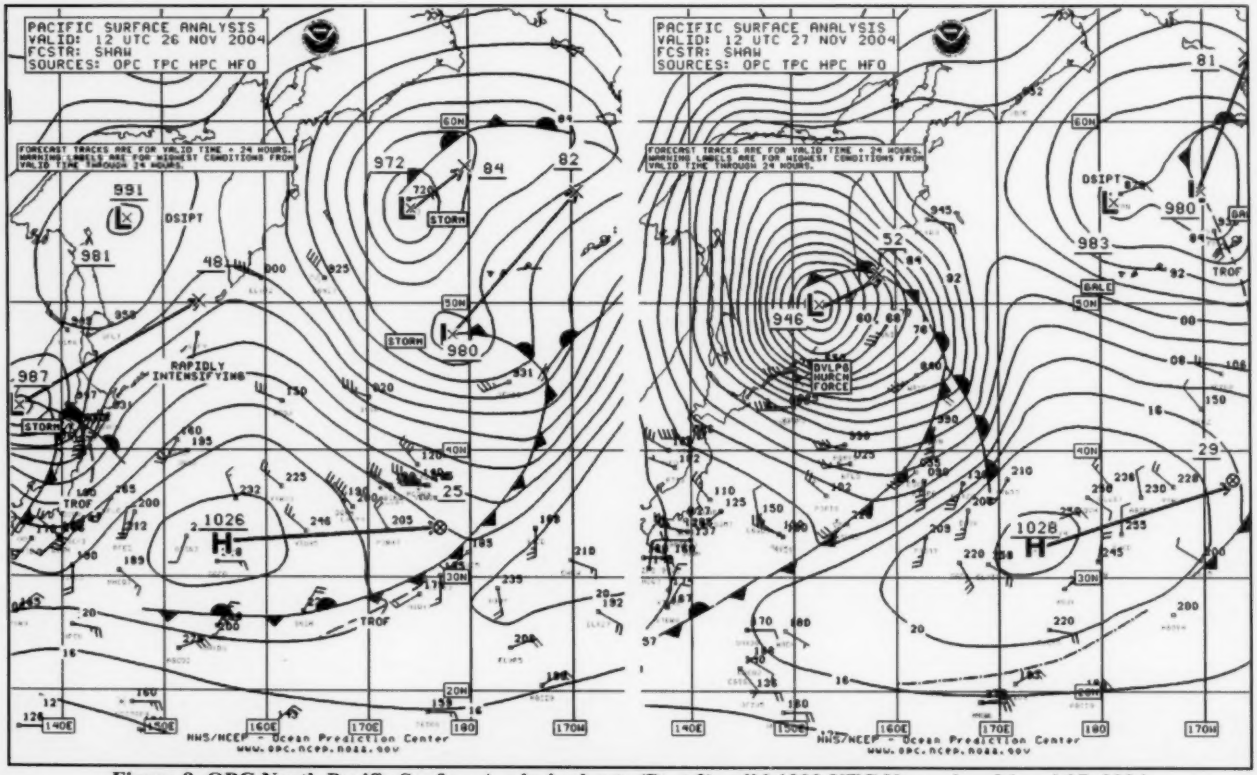


Figure 9. OPC North Pacific Surface Analysis charts (Part 2) valid 1200 UTC November 26 and 27, 2004

OPC labeled it as a hurricane-force storm for a twenty-four hour period beginning at 1800 UTC on the 1st. QuikScat winds revealed 65 kts wind barbs southwest of the center, similar to ***Figure 8***. The ship **Cap Delgado** (A8BF9) (45N 157W) encountered southwest winds of 45 kts and 7.6 m seas (25 ft) at 0600 UTC December 6. The NOAA buoy 46066 (53N 155W) reported a west wind of 40 kts and 12.0 m seas (39 ft) at 1600 UTC December 2. The storm then weakened near the Alaskan coast by the 4th.

Western North Pacific Storm, December 3–5: A complex low-pressure system developed just southeast of the Kurile Islands on December 2 and drifted northeast while intensifying, leading to a hurricane-force low in the southwest Bering Sea as shown in ***Figure 10***. The system was deepest at that time, and the hurricane-force winds occurred in the northeast flow north of the occluded front, in the northern Bering Sea, as revealed by QuikScat data. The higest winds reported by ships in this storm were up to 55 kts south of the Kamchatka Peninsula as shown in ***Figure 10***. The system subsequently weakened near the Alaskan coast on December 6.

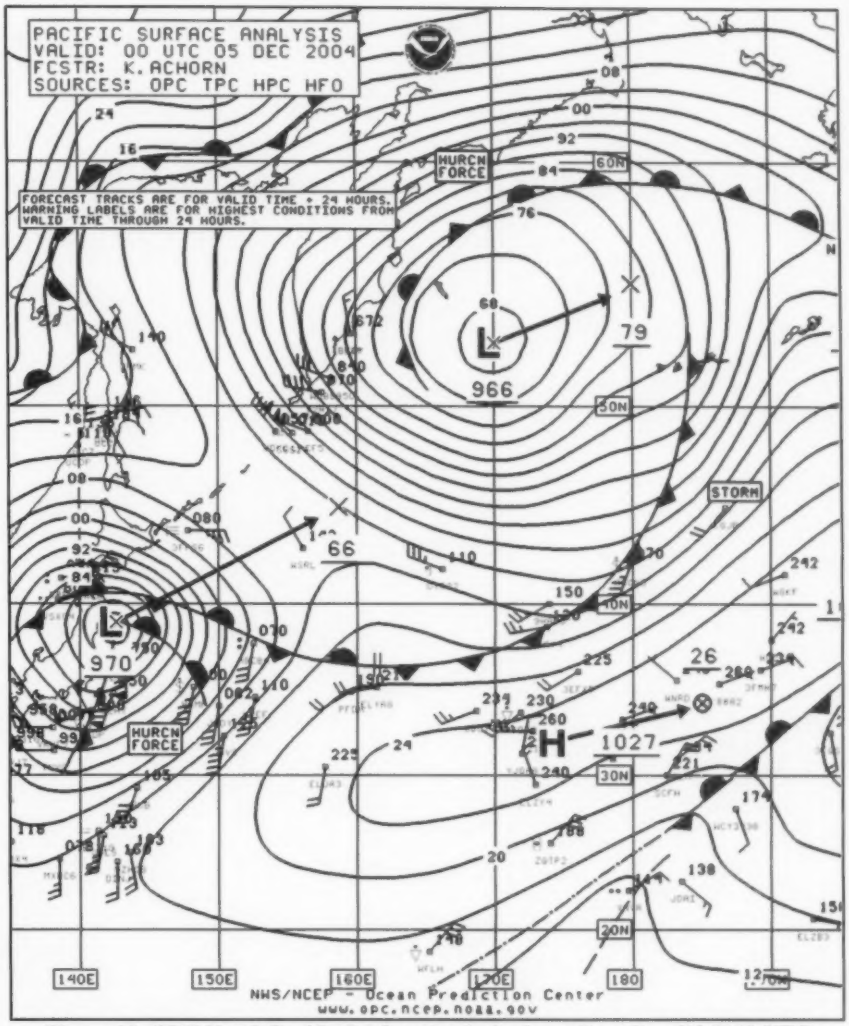


Figure 10. OPC North Pacific Surface Analysis chart (Part 2) valid 0000 UTC December 5, 2004.

North Pacific Storm of December 4–8: ***Figure 10*** shows this storm just after it moved out of the Sea of Japan, already with a 970 hPa central pressure and hurricane-force winds, as revealed by ship reports. The **Leverkusen Express** (DEHY) reported a southwest wind of 80 kts near 35N 142E at 0000 UTC December 5. The **Polar Eagle** (ELPT3) encountered south winds of 70 kts near 37N 143E at that time. Also **Puteri Intan Satu** (9MET6) (34N 141E) experienced southwest winds of 60 kts. Six hours later, the ship **Daishin Maru** (3FPS6) near 43N 146W reported east winds of 65 kts. The storm maintained hurricane-force winds through 0000 UTC December 6 while tracking northeast. The system, after some weakening by the 6th, strengthened to 953 hPa by the 8th to become a large storm covering much of the area east of the dateline. The center then turned north and dissipated near southern mainland Alaska late on the 10th.

North Pacific Storm, December 11–14: ***Figure 11*** displays the rapid spinup of this compact and potent storm over only an eighteen hour period when much of the intensification occurred. The central pressure dropped 36 hPa during this period. The satellite image in ***Figure 12*** matches the second part of ***Figure 11*** when the center was near maximum intensity. The numbered lines on the image are model pressure forecasts which appear to not capture this rapid initial deepening. An eye-like cloud formation appears at the center suggesting a very intense low. A ship, the **San Clemente** (ELVB3) reported at 2100 UTC December 11 (halfway between the two analysis times in ***Figure 11***) with a south wind of 70 kts and a pressure of 972 hPa. A high-resolution QuikScat pass (***Figure 13***) shows several 95 kts wind barbs as west to southwest winds in the lower left portion of the image. Some are rain-flagged (in white) and others are not. The author has looked at QuikScat data since 1999 and has never seen 95 kts winds in QuikScat images. The storm maintained hurricane-force winds through 1800 UTC on the 13th and the lowest central pressure was 963 hPa at 0000 UTC on the 13th, near 45N 177W. At 0000 UTC December 14, **Providence Bay** (MSTM6) (36N 173W) reported a west wind of 55 kts. The system weakened to a gale near 44N 163W on the 14th and then turned north and weakened over southwest Alaska by the 16th. A secondary storm formed to the east by the 16th and briefly developed hurricane-force winds with a 971 hPa center in the northeast Gulf of Alaska at 1800 UTC December 16 before moving inland shortly thereafter.

Western North Pacific Storm, December 17–20: This storm originated near Japan late on December 15 and moved east between 41N and 44N. Much of the initial intensification was in the twenty-four hour period ending at 0600 UTC on the 17th, when the pressure dropped 24 hPa. The storm was labeled as hurricane force by OPC from 1200 to 1800 UTC on the 17th, with the center developing a lowest pressure of 972 hPa near 43N 159E at the latter time. At 1800 UTC December 17 the vessel **Providence Bay** (MSTM6) reported a west wind of 65 kts at 39N 159E. The system continued to track east and weakened to a gale by the 22nd and then re-formed to the north and moved into Alaska late on the 22nd.

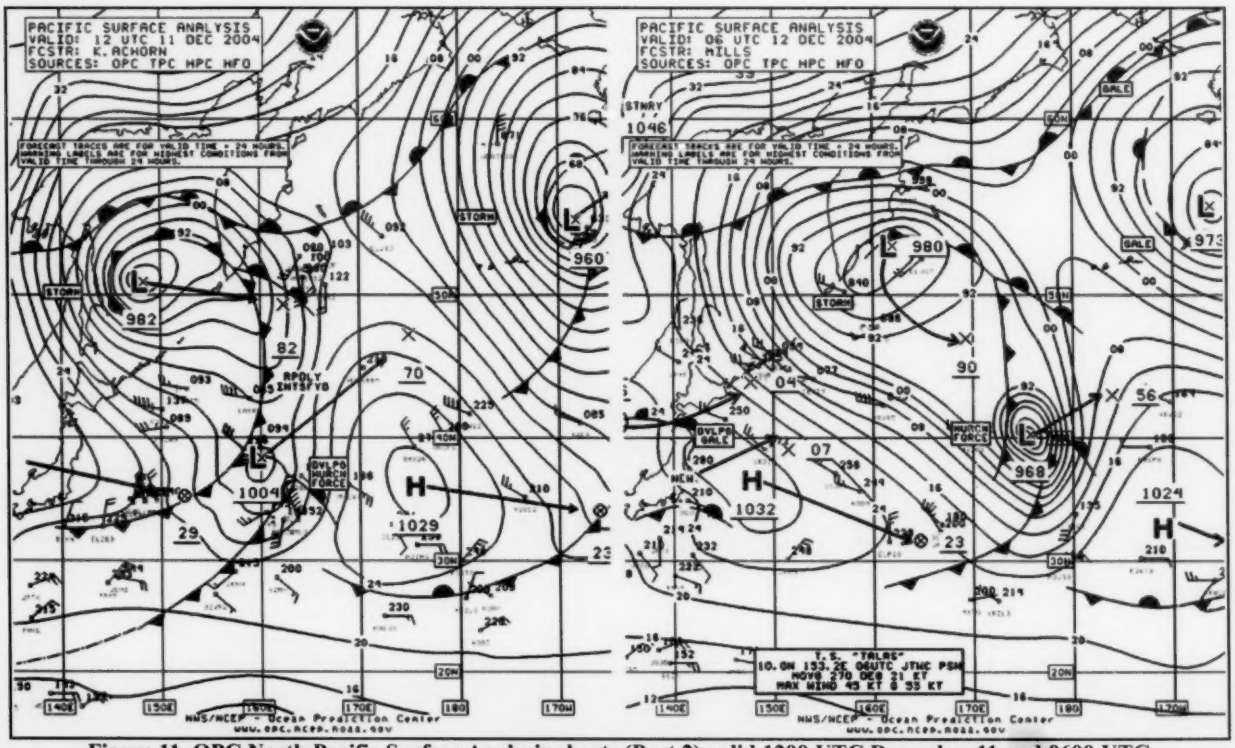


Figure 11. OPC North Pacific Surface Analysis charts (Part 2) valid 1200 UTC December 11 and 0600 UTC December 12, 2004.

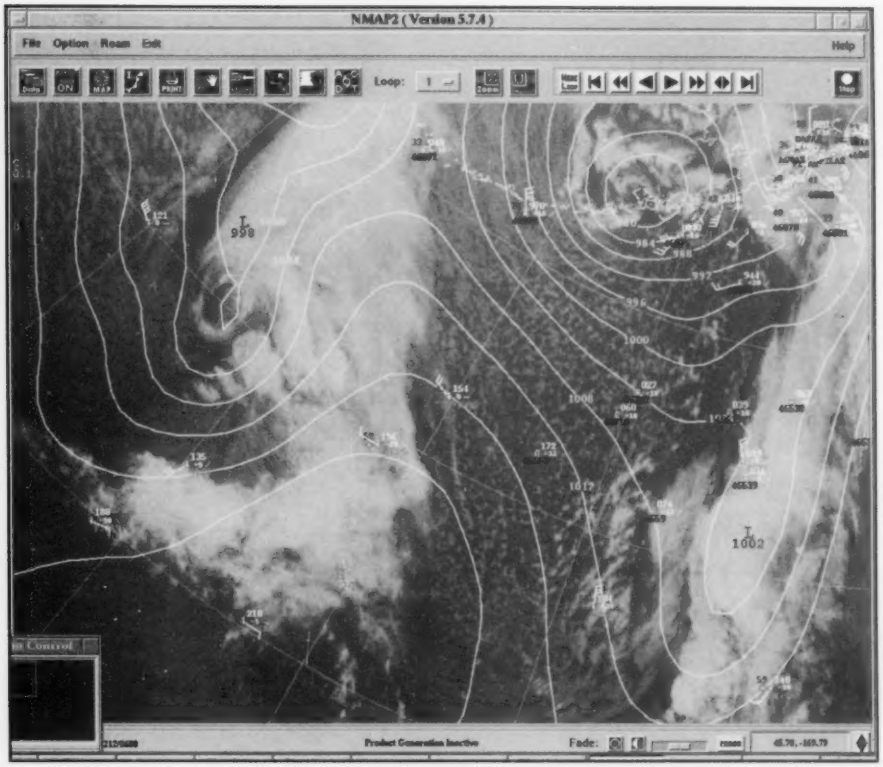


Figure 12. GOES-10 infrared satellite image of portion of North Pacific valid at 0600 UTC December 12, 2004. The valid time is the same as that of the second part of *Figure 11*.

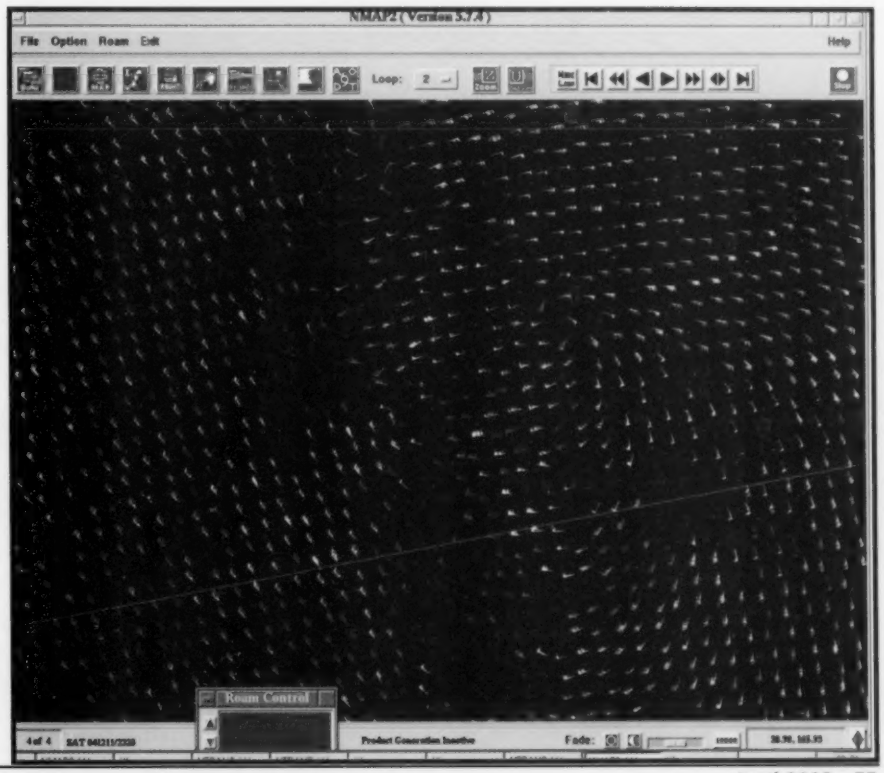


Figure 13. High-resolution QuikScat scatterometer image of satellite-sensed winds south of the storm shown in *Figure 11*. The valid time of the pass is approximately 1800 UTC December 11, 2004, or about six hours later than the valid time of the first part of *Figure 11*.

Image is courtesy of NOAA/NESDIS/Office of Research and Applications

Western North Pacific Storm, December 29–31: A complex frontal wave of low pressure south of Japan at 0000 UTC December 29 rapidly intensified while moving northeast, with the central pressure dropping 38 hPa in the first twenty-four hours. The low developed hurricane-force winds by 0000 UTC December 30 which persisted to the end of the month. ***Figure 14*** shows a relatively compact storm system (958 hPa) at 1200 UTC on the 30th, and the corresponding infrared satellite image (***Figure 15***) reveals a broad comma-type cloud formation with cold tops, a well-defined center and higher clouds wrapping around the center. Cold-air cumulus-type clouds appear south of the center. The QuikScat image of ***Figure 16*** valid several hours prior to the second part of ***Figure 14*** reveals numerous 60 to 80 kts wind observations in the south semicircle of the center with even one 90 kts wind barb southwest of the center. The center deepened further to 951 hPa near 48N 172E at 0000 UTC on the 31st, making it the second deepest of the September-to-December period. The ship **OOCL New York** (DPAK) (41N 170E) reported northwest winds of 45 kts and 12.0 m seas (39 ft) at 0900 UTC December 31. The **President Adams** (WRYW) encountered northwest winds of 50 kts and 9.0 m seas (30 ft) near 50N 160E at 0600 UTC on the 31st. The buoy 46071 (51N 179E) reported a south wind of 30 kts and 12.2 m seas (40 ft) at 1600 UTC December 31. The storm continued on a northeastward track and began to weaken through the end of the month.

Acknowledgement

The author wishes to recognize the contribution of Donald S. Prosise of OPC who saved satellite information on the December 12 storm in the western North Pacific while the author was on leave.

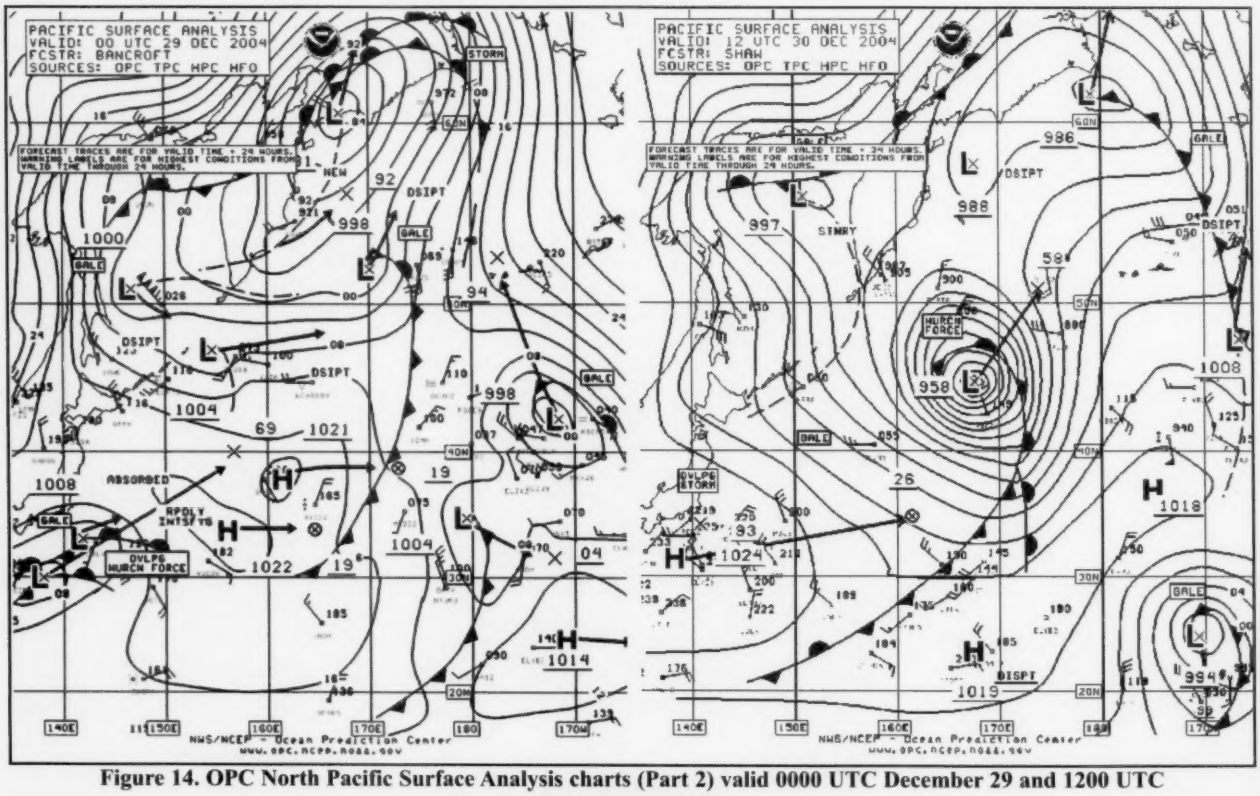


Figure 14. OPC North Pacific Surface Analysis charts (Part 2) valid 0000 UTC December 29 and 1200 UTC December 30, 2004

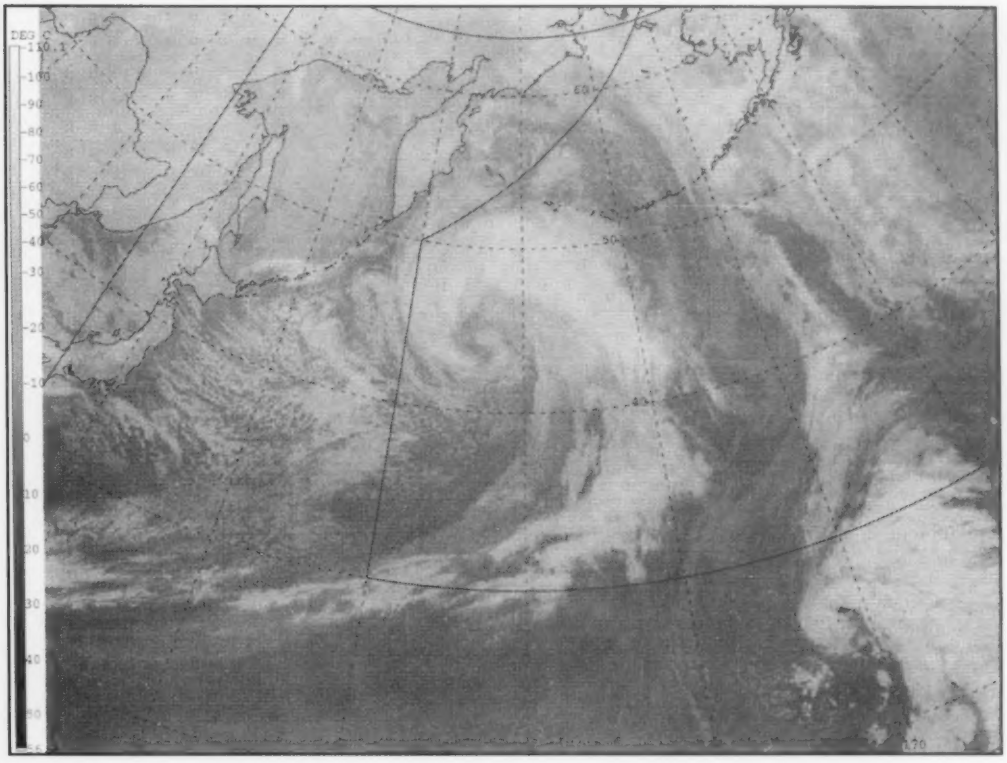


Figure 15. GOES-9 infrared satellite image of portion of western North Pacific valid at 1030 UTC December 30, 2004. The valid time is only on and one-half hours prior to that of the second part of *Figure 14*.

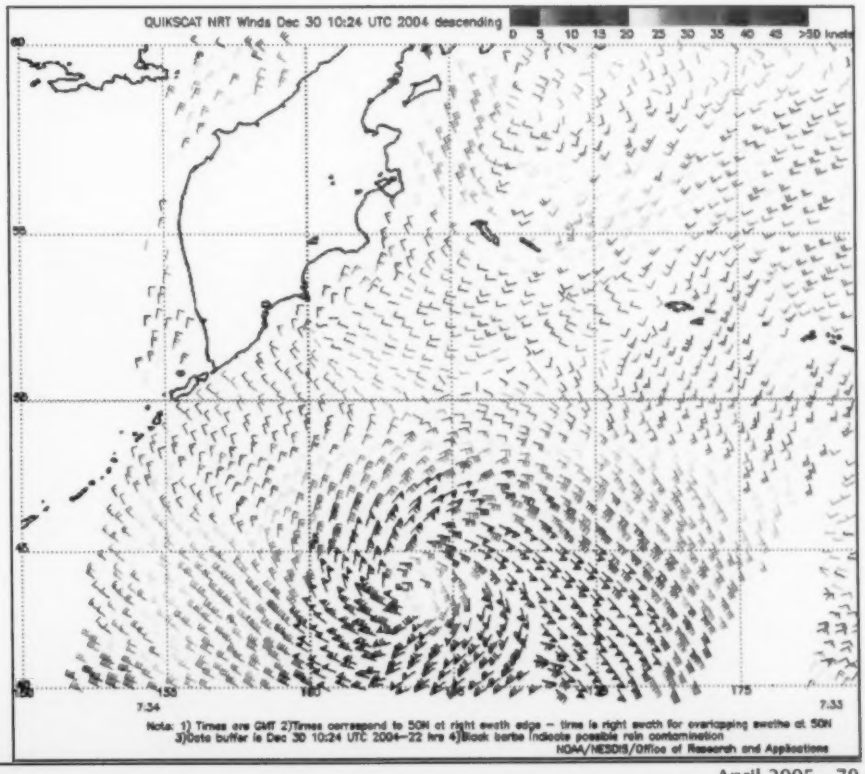


Figure 16. QuikScat scatterometer image of sattelite-sensed winds around the storm shown in *Figure 14*. The valid time of the pass is 0734 UTC December 30, 2004, or about four and one-half hours prior to the valid time of the second part of *Figure 14*.

Image is courtesy of NOAA/NESDIS/Office of Research and Applications.

Marine Weather Review—Tropical Atlantic and Tropical East Pacific Areas July through December 2004

Daniel P. Brown and Hugh D. Cobb III, Tropical Analysis and Forecast Branch , Tropical Prediction Center, NOAA/NWS Miami, Florida

A Brief Overview of the Tropical Prediction Center's (TPC) Tropical Analysis and Forecast Branch.

The Tropical Analysis and Forecast Branch (TAFB) is one of three branches of NOAA's Tropical Prediction Center (TPC). The other branches are the Hurricane Specialist Unit and the Technical Support Branch (TSB). TAFB is responsible for issuing marine forecasts for the tropical and subtropical Atlantic Ocean, Caribbean Sea, Gulf of Mexico, and the tropical and subtropical areas of the eastern Pacific Ocean (***Figure 1***). In order to complete the assigned duties, TAFB maintains three operational forecast desks 24 hours each day, 365 days per year. One operational desk is responsible for the surface analysis, Atlantic Tropical Weather Discussion, and peak wave period/peak swell direction forecast charts. The other two forecast desks are divided by forecast basin with an Atlantic and Pacific forecaster responsible for the products for each respective area.

Each day, TAFB forecasters issue a total of 32 marine text forecasts. These include three separate High Seas (Atlantic, northeast Pacific, and southeast Pacific) and NAVTEX forecasts four times daily. The High Seas Forecasts only include areas of wind greater than 20 kts and seas 8 ft or higher. These marine forecasts are tailored towards larger ships that spend days to weeks at sea. TAFB also composes a more detailed Offshore Waters Forecast for the Gulf of Mexico,

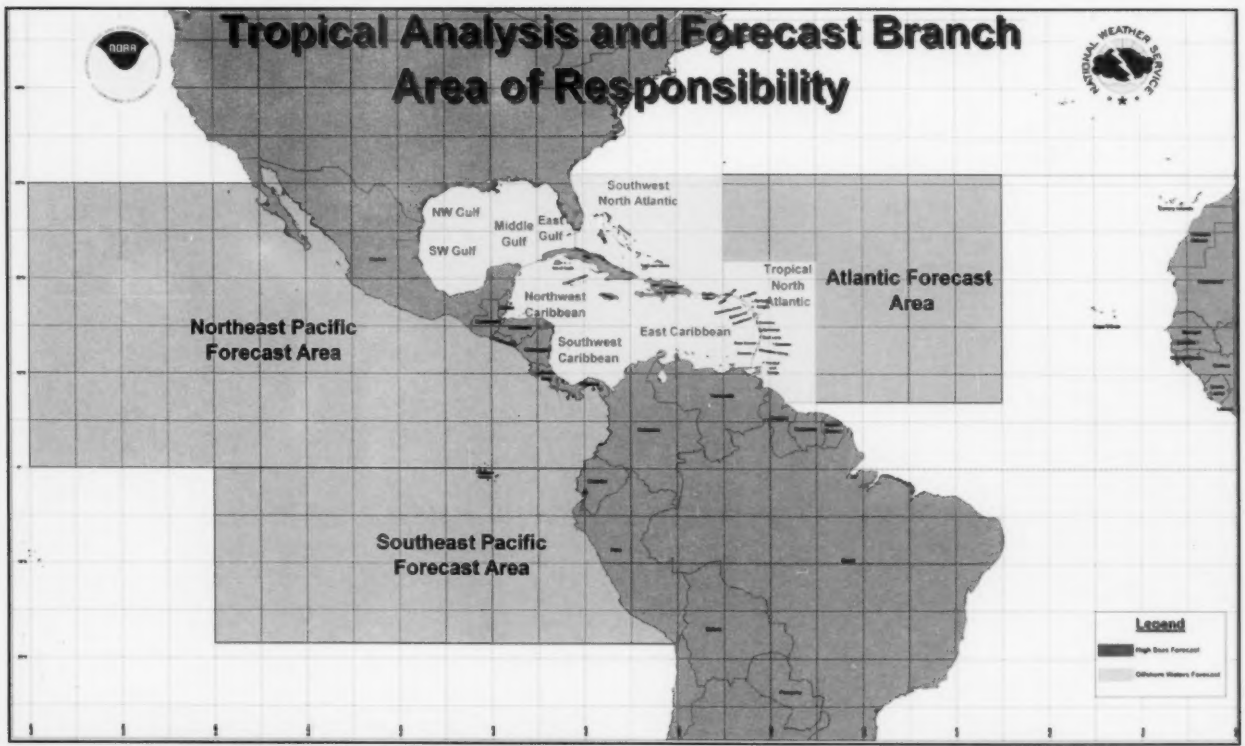


Figure 1. Map showing the TAFB area of forecast responsibility which covers approximately 12 million square nautical miles. The light gray area indicates the area covered by the Offshore Waters Forecasts. Both the dark gray and light gray areas are covered by the High Seas Forecast.

Caribbean Sea, and the southwest and tropical North Atlantic four times daily. These more detailed forecasts are geared toward smaller vessels that may venture offshore for a few days at a time. A detailed description of each of these marine forecast products is available at www.nhc.noaa.gov/abouttafbprod.shtml. Forecasters also produce a Marine Weather Discussion for the offshore area twice daily. The discussion describes weather features that are or will be affecting the forecast area during the next 5 days. Meteorologists routinely discuss differences or similarities in the numerical models that they are basing their forecast on. They may also reference current ship, buoy or QuikSCAT data that have influenced the forecast. By reading the discussion one may get a better understanding of the confidence level that the forecasters has placed on his or her forecast. TAFB meteorologists (***Figure 2***) also write Tropical Weather Discussions for the Atlantic and East Pacific areas. These discussions tend to provide a detailed description of the atmosphere in general and are usually less focused on marine weather. However, since there is no Marine Weather Discussion for the eastern Pacific, forecasters will occasionally highlight significant marine events in the East Pacific Tropical Weather Discussion. These significant events may include gale or storm force winds in the Gulf of Tehuantepec or strong wind events in the Sea of Cortez or Gulf of Papagayo.

If the saying, "a picture is worth a thousand words" is correct, then TAFB's 45 graphical analysis and marine forecast products issued daily must provide mariners with a great deal of valuable information. TAFB issues a surface analysis every six hours for the tropical and subtropical Atlantic and eastern Pacific Oceans. TAFB meteorologists also provide 3-hourly surface analyses for Florida, the Gulf of Mexico and Mexico for a large surface weather map that is issued by the Hydrometeorological Prediction Center in Washington, D.C. Additionally, a sea-state analysis is completed at 0000 and 1200 UTC each day for the tropical and subtropical Atlantic basin. When producing both the surface and sea-state analysis the meteorologists are relying on all available ship data. The VOS ship data is an extremely important tool that can be used to determine the location of weather features such as troughs, fronts, lows and highs. This ship data is also valuable "ground truth" that helps the forecaster to evaluate numerical forecast model output. Being able to determine model performance helps the forecaster produce much more accurate forecasts and warnings.

Figure 2. TAFB meteorologist Michael Formosa, looks at satellite and surface data while preparing the Atlantic Tropical Weather Discussion. The TAFB operation area is located next to the NHC hurricane perational area (upper left).

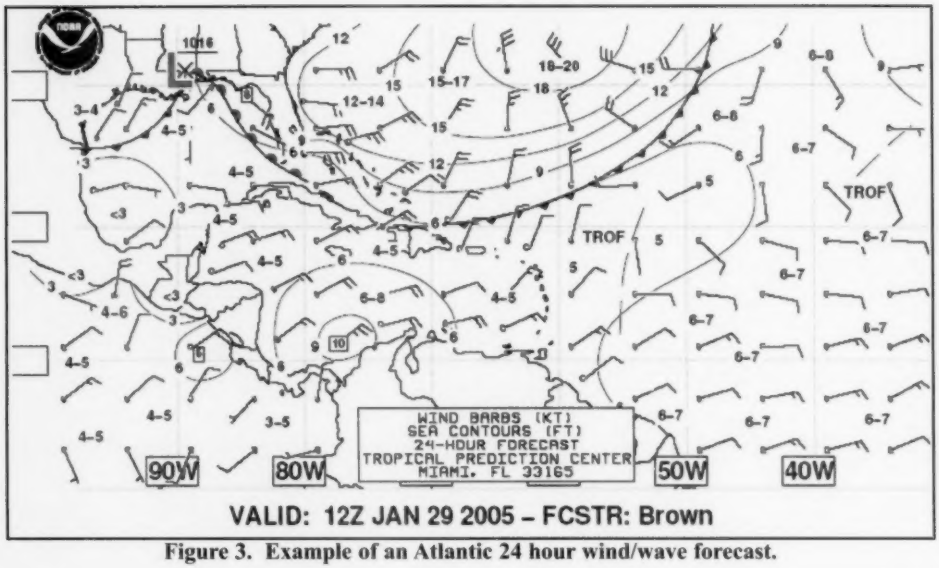


Figure 3. Example of an Atlantic 24 hour wind/wave forecast.

TAFB's graphical marine forecast products include 24, 48, and 72 hour wind/wave (***Figure 3***) and surface pressure forecasts for both the Atlantic and east Pacific Basins. The wind/wave forecast provides a prediction of surface winds and sea heights across the basin. Forecast positions of weather features such as fronts, troughs, lows, highs, tropical cyclones, and gale or storm warning areas are depicted. The surface pressure forecast also includes forecast positions of the significant weather features and areas of gale or storm force winds. All of these graphical forecasts are issued twice daily, except the 24 hour wind/wave chart which is issued 4 times daily.

Figure 4 is a Graphical Product Legend that explains how to interpret the wind barbs on the wind/wave charts and also provides definitions for each symbol or abbreviation used on the products. Additional marine graphics include the Tropical Cyclone Danger Graphic which depicts a tropical cyclone's forecast track and area of possible danger. The area of "danger" is computed using the 1-2-3 rule which adds 100, 200, and 300 nmi to the 34 kts wind radii at the 24, 48, and 72 hour forecast positions. The Danger Graphic also includes areas of possible tropical cyclone formation within the next 36 hours. Outside of hurricane season the Danger Graphic becomes a High Wind and Associated Seas Graphic which depicts current areas of high wind over the Atlantic and Pacific Oceans. The suite of graphical marine products that TAFB produces is avail-

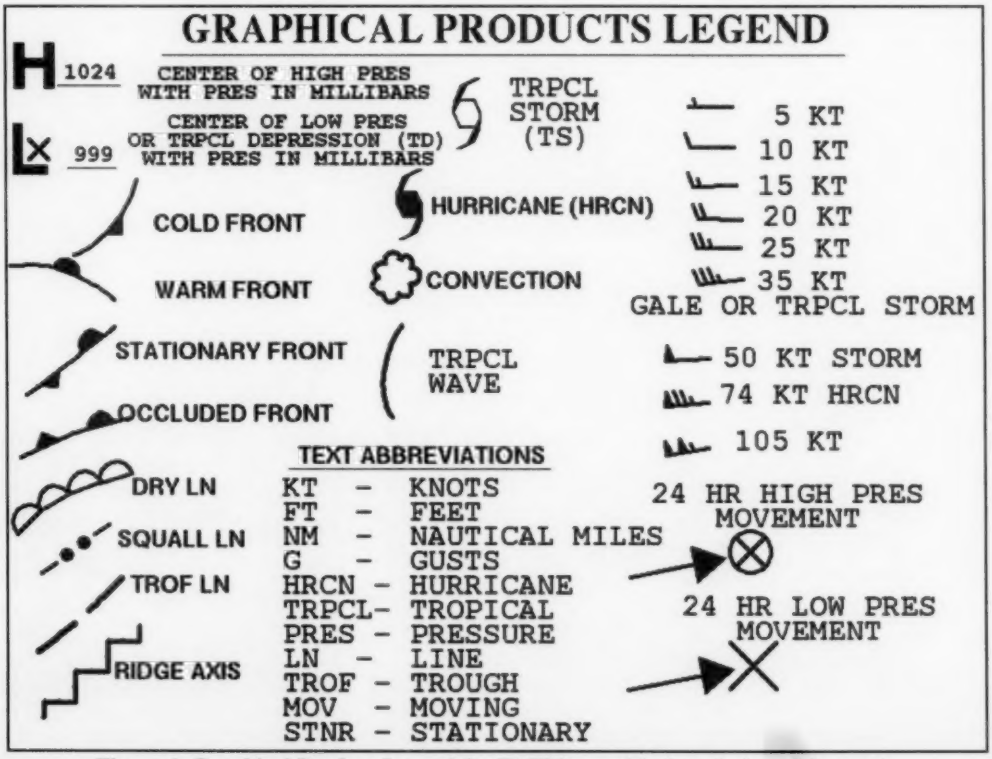


Figure 4. Graphical Product Legend for TAFB's graphical analysis and forecasts.

able via RadioFAX and on the world wide web on both the TAFB (www.nhc.noaa.gov/forecast.shtml) and National Weather Service (www.nws.noaa.gov/marine) sites. ***Table 1*** is the current New Orleans RadioFAX broadcast schedule which includes all the graphical forecasts TAFB issues for the Atlantic, Caribbean, and Gulf of Mexico. TAFB's eastern Pacific forecasts are available on the Pt. Reyes or Honolulu RadioFAX broadcast. These schedules are available on the world wide web at www.nws.noaa.gov/om/marine/radiofax.htm.

Figure 5. TAFB Meteorologist Daniel Brown performs a Dvorak satellite intensity estimate (classification) of Hurricane Jeanne from the TAFB Pacific/Classification Desk

NEW ORLEANS, LOUISIANA, U.S.A.

CALL SIGN	FREQUENCIES	TIMES	EMISSION	POWER
NMG	4317.9 kHz	CONTINUOUS	F3C	4 KW
	8503.9 kHz	CONTINUOUS	F3C	4 KW
	12789.9 kHz	CONTINUOUS	F3C	4 KW
	17146.4 kHz	1200-2045	F3C	4 KW

TIME	CONTENTS OF TRANSMISSION	RPM/IOC	VALID TIME	MAP AREA
0000/1200	TEST PATTERN	120/576		
0005/1205	U.S. / TROPICAL SURFACE ANALYSIS (W HALF)	120/576	18/06	1
0020/1220	TROPICAL SURFACE ANALYSIS (E HALF)	120/576	18/06	2
0035/1235	24 HR WIND/WAVE FORECAST	120/576	00/12	3
0045/1245	48 HR WIND/WAVE FORECAST	120/576	00/12	3
0055/1255	72 HR WIND/WAVE FORECAST	120/576	00/12	3
0105/1305	24 HR SURFACE FORECAST	120/576	00/12	3
0115/1315	48 HR SURFACE FORECAST	120/576	00/12	3
0125/1325	72 HR SURFACE FORECAST	120/576	00/12	3
0135/1335	TROPICAL CYCLONE DANGER AREA* or HIGH WIND/WAVES	120/576	21/09	6
0150/------	72 HR WAVE PERIOD/SWELL DIRECTION	120/576	0000	3
------/1350	(REBROADCAST OF 0150)	120/576	0000	3
0200/1400	GOES IR TROPICAL SATELLITE IMAGE	120/576	00/12	4
0215/1415	00HR SEA STATE ANALYSIS	120/576	00/12	3
------/1425	PRODUCT NOTICE BULLETIN	120/576		
0225/1445	HIGH SEAS FORECAST (IN ENGLISH)	120/576	22/10	5
0600/1800	TEST PATTERN	120/576		
0605/1805	U.S. / TROPICAL SURFACE ANALYSIS (W HALF)	120/576	00/12	1
0620/1820	TROPICAL SURFACE ANALYSIS (E HALF)	120/576	00/12	2
0635/1835	24 HR WIND/WAVE FORECAST	120/576	06/18	3
0645/1845	REBROADCAST OF 0045/1245	120/576	00/12	3
0655/1855	REBROADCAST OF 0055/1255	120/576	00/12	3
0705/1905	REBROADCAST OF 0105/1305	120/576	00/12	3
0715/1915	REBROADCAST OF 0115/1315	120/576	00/12	3
0725/1925	REBROADCAST OF 0125/1325	120/576	00/12	3
0735/1935	TROPICAL CYCLONE DANGER AREA* or HIGH WIND/WAVES	120/576	03/15	6
0750/1950	48 HR WAVE PERIOD/SWELL DIRECTION	120/576	12/00	3
0800/2000	GOES IR TROPICAL SATELLITE IMAGE	120/576	07/18	4
0815/2015	REBROADCAST OF 0215/1415	120/576	00/12	3
0825/2025	REQUEST FOR COMMENTS/BROADCAST SCHEDULE	120/576		
0845/2045	HIGH SEAS FORECAST (IN ENGLISH)	120/576	04/16	5

NOTES:1 REPLACED BY HIGH WIND/WAVE WARNING WHEN NOT IN HURRICANE SEASON
DEC 01 - MAY 15 VALID TIMES 00Z 06Z 12Z AND 18Z 05N - 40N 35W - 100W
2 CARRIER FREQUENCY IS 1.9 KHZ BELOW ASSIGNED FREQUENCY
3 THIS BROADCAST ORIGINATES FROM THE TROPICAL PREDICTION CENTER (FORMERLY THE NATIONAL HURRICANE CENTER) OF THE NATIONAL WEATHER SERVICE.
COMMENTS AND SUGGESTIONS SHOULD BE DIRECTED TO:

TROPICAL PREDICTION CENTER
ATTN: CHIEF OF TAFB
11691 SOUTHWEST 17TH STREET
MIAMI, FL 33165-2149
PHONE: (305) 229-4430/FAX: (305) 553-1264
EMAIL: tpc.mar@noaa.gov

MAP AREAS: 1. 05S-50N, 55W-125W
2. 05S-50N, 00W-070W
3. 00N-31N, 35W-100W
4. 12S-44N, 20W-112W
5. 07N-31N, 35W-098W (AREA COVERED BY TEXT FORECAST)
6. 05N-60N, 00W-100W

(Information dated Feb 10, 2004) http://weather.noaa.gov/fax/gulf.shtml

Table 1. Marine RadioFAX Schedule for the New Orleans, Louisiana broadcast site. These products cover the Atlantic from the equator to 35°N west of 35°W, including the Caribbean Sea and Gulf of Mexico. Additional RadioFAX information and schedules can be found on the world wide web at www.nws.noaa.gov/om/marine/radiofax.htm

TAFB is also responsible for several tropical cyclone related products in support of the TPC/National Hurricane Center (NHC) tropical cyclone forecast and warning program. TAFB meteorologists use the Dvorak Technique to estimate the position and intensity of both active and developing tropical cyclones (***Figure 5***). The Dvorak estimates are routinely provided to the NHC Hurricane Specialists who use them to help determine the strength and location of a tropical cyclone. Forecasters at TPC/NHC have been using the Dvorak Technique for over 30 years to help determine a tropical cyclone's intensity. The intensity estimates are based on the organizational structure of the storm. This may include the amount of thunderstorm banding which wraps around the center or how distinct the eye of a hurricane is. These intensity estimates are extremely important when a storm is too far from land for reconnaissance aircraft to fly into. Beginning in 2004, TAFB forecasters also provided position esti-

mates for tropical storms and hurricanes from microwave satellite imagery. Microwave images are a relatively new form of data that is obtained from several polar-orbiting satellites. The microwave imager on the satellites can "peer" through clouds to help the forecaster determine the center location and the overall storm structure.

During the peak of the season, between August 1 and mid-October, TAFB meteorologists work with the Hurricane Specialists as Hurricane Support Meteorologists (HSM). The HSM's provide forecast support to the NHC Hurricane Specialists. HSM's will aid in gathering and analyzing surface, ship, satellite, and reconnaissance data. They also provide tropical cyclone center location estimates from radar once a system is close enough to land to be tracked. During busy times HSM's also provide media and forecast support. During the busy 2004 hurricane season, HSM's aided in the preparation of a number of tropical cyclone forecast advisory packages when multiple storms were occurring across the Eastern Pacific and Atlantic basins.

In addition, to performing regular forecast duties, most TAFB meteorologists work on research projects or computer applications that can help to produce more useful and accurate forecasts. With such a large and diverse area of forecast responsibility, TAFB forecasters stay very busy developing all these forecast and analysis products. Hopefully, this brief look into TAFB operations has provided a better understanding the forecast responsibilities of TAFB and of our job as marine forecasters. If you have any questions or comments about TAFB or our products please feel free to contact Christopher Burr (Christopher.A.Burr@noaa.gov), chief of the TAFB, or Daniel Brown (Daniel.P.Brown@noaa.gov). We would be happy, as time permits, to answer your correspondence. Here's to fair winds and following seas in your journeys.

SIGNIFICANT WEATHER OF THE PERIOD

Please refer to the articles on the 2004 Atlantic and Eastern North Pacific Hurricane Season for information about tropical systems during this past hurricane season. This article will provide a brief review of non-tropical weather systems that produced significant weather across the tropical and subtropical regions of the Atlantic and Eastern Pacific during the second half of 2004.

Atlantic, Caribbean and Gulf of Mexico:

A total of seven non-tropical gale events occurred over the tropical and subtropical Atlantic, Caribbean and Gulf of Mexico from July through December 2004 (***Table 2***). The first event of the fall and winter season occurred a couple weeks later than normal. Thereafter, three separate cold fronts produced gales over the Gulf of Mexico or Atlantic in November and December. Two lows also produced gales in the subtropical Atlantic during the period. The first low developed on the 25 November and produced gale force winds south of 31N from 27–30 November. This low transitioned from an extra-tropical low into Tropical Storm Otto on 30 November. Please refer to the article on the 2004 Atlantic Hurricane Season for more information on Otto. The most significant event of the peri-

Atlantic, Caribbean and Gulf of Mexico of Non-Tropical Gales Between July and December 2004.

Event	Area	Beginning	Ending
1	Atlantic Cold Front	0000 UTC 03 November	1200 UTC 04 November
2	Gulf of Mexico Cold Front	1200 UTC 03 November	0000 UTC 04 November
3	Eastern Atlantic Low (Pre-Otto)	1200 UTC 27 November	1200 UTC 30 November
4	Gulf of Mexico Cold Front	1200 UTC 14 December	1200 UTC 15 December
5	Atlantic Cold Front	0600 UTC 20 December	1800 UTC 21 December
6	Atlantic Low	1800 UTC 23 December	1800 UTC 25 December
7	Gulf of Mexico and western Atlantic Low	0000 UTC 25 December	0000 UTC 27 December

Table 2. Estimated beginning and ending times of Atlantic, Caribbean and Gulf of Mexico non-tropical gale events between July and December, 2004.

od occurred between 25–27 December. This event was produced by a strong low that developed over the Gulf of Mexico. This low created near storm force conditions over the Gulf.

Gulf of Mexico and western Atlantic Low 25–27 December: The stage was set for this rather unusual event on the 22 December as a strong cold front moved into the northwestern Gulf of Mexico. The front moved southeastward across the western and middle Gulf on 23 December. At 1200 UTC 24 December, the front extended from central Florida to the southern Bay of Campeche. The front continued to move slowly southward over the Florida peninsula but became stationary over the southern Gulf of Mexico. A strong mid- to upper-level low pressure system moving across northern Mexico and southern Texas aided in the development of a surface low along the stationary front over the south-central Gulf of Mexico late on the 24th.

As the low strengthened, gale force winds began blowing west of the low over the western Gulf of Mexico early on the 25 December. The ships **Deepwater Horizon** (H3SM) and **Frances L** (C6YE) both observed 35 kts winds in the central Gulf of Mexico at 0600 and 1200 UTC respectively. By 1400 UTC, NOAA buoy 42002 (25.2N 94.4W) in the western gulf reported 35 kts winds and sea heights that peaked at 6 m (20 ft). The low continued to slowly strengthen and, by 1800 UTC, was analyzed over the central Gulf of Mexico near 25N 89.5W (***Figure 6***). At this time, the ship **Deepwater Millennium** (3FJA9) observed 37 kts winds over the north-central Gulf. As the low moved slowly east-northeastward, winds at the middle Gulf NOAA buoy 42001 (25.8N 89.7W) became north-northwest and increased to gale force at 1900 UTC. The winds at the buoy increased to 45 kts with gusts to 58 kts at 2000 UTC. At 0000 UTC 26 December, the low was just northwest of the eastern Gulf NOAA buoy 42003 (26N 85.9W). Winds at the buoy increased to gale force by 0100 UTC. Between 0400 and 0600 UTC winds at the buoy peaked at 45 kts with gusts to 56 kts.

Between 0600 and 0900 UTC 26 December, the low moved across the Florida peninsula, entering the west coast just north of Tampa Bay, then exiting the east coast near Daytona Beach. Once the low moved into the Atlantic, gale force winds began blowing off the northeast Florida coast. NOAA's Atlantic buoys 41009 (28.5N 80.2W), 41010 (28.9N 78.5W), and 41012 (30.0N 80.6W), all reported 35 to 40 kts wind with gusts to around 45 kts. By 1800 UTC, the low was centered off the coast of North Carolina with a cold front trailing south across the central Bahamas and eastern Cuba. The low continued to move northeastward away from the area and gale conditions ended south of 31N by 0000 UTC 27 December.

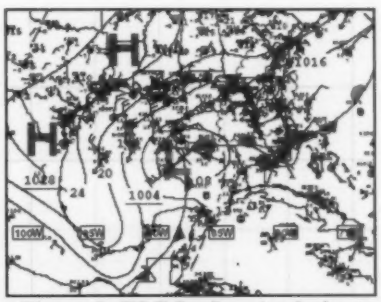


Figure 6. TPC Surface Analysis at 1800 UTC 25 December, 2004.

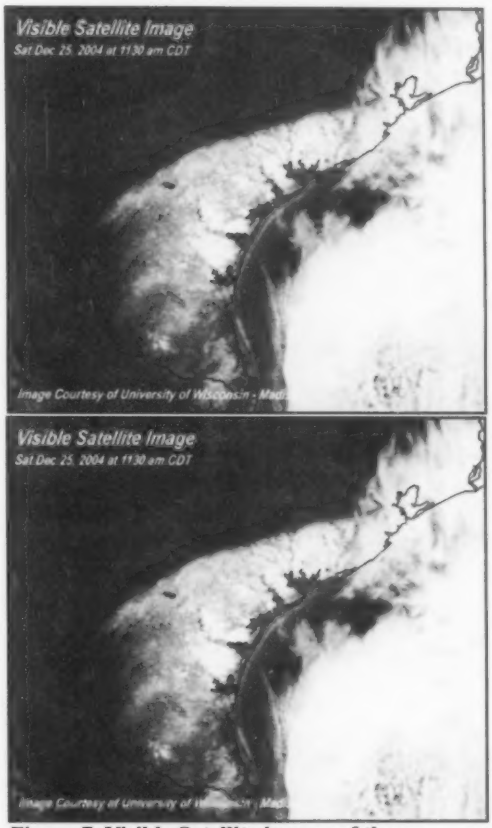


Figure 7. Visible Satellite images of the Christmas day snowfall over southeastern Texas.

Images courtesy of University of Wisconsin-Madison

With cold arctic air in place along the Gulf Coast, this event not only produced gale to near storm force winds over the Gulf of Mexico, but also brought snow and sleet to portions of the southeastern United States on Christmas Day. The snow event will be remembered for many years across south Texas, because it produced an historic white Christmas from the Houston-Galveston area south to Brownsville and into northern Mexico. The snow that accumulated at Brownsville was the first since February 1895. The event also set new all-time snowfall records of 4.4 inches at Corpus Christi and 12.5 inches at Victoria. ***Figure 7*** includes two visible satellite images from the

25th and 26th December that show the snow cover over southeast Texas. Snow and sleet also fell along the northern Gulf coast from Louisiana to the western Florida Panhandle. Significant snow also accumulated across eastern portions of North Carolina and Virginia on the 26th.

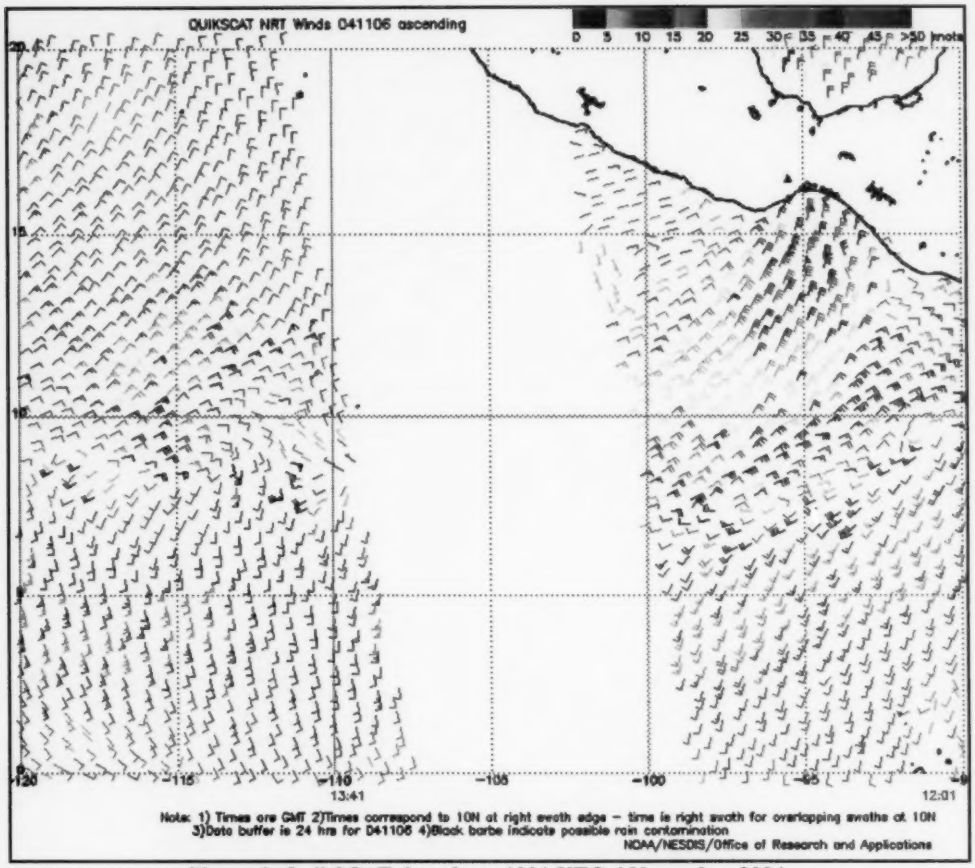


Figure 8. QuikSCAT data from 1201 UTC 6 November 2004.

Eastern North Pacific

The first Gulf of Tehuantepec gale event of the season began in early November. Once the Tehuantepec season began, the events occurred quite regularly during November and December. A total of seven Gulf of Tehuantepec gale events occurred during the period. Storm force winds were observed during three of these events. ***Table 3*** is a list of the estimated beginning and ending times of Gulf of Tehuantepec gale and storm events between July and December 2004. These events were verified by either a reliable ship observation or timely Quikscat data.

Gulf of Tehuantepec Events: The first Gulf of Tehuantepec event began around 1800 UTC 3 November and lasted for nearly a week. A QuikSCAT pass on 2344 UTC 3 November was the first confirmation of a gale event, with 40 kts wind indicated in the Gulf of Tehuantepec. As a result of the long duration of this event, there were several ships which reported gale force winds. The first report was at 1800 UTC 4 November when the ship **Maersk Rio Grande** (ZDFK7) reported north-northeast winds of 45 kts and 13 ft seas while located near 15 N 95 W. At 0600 UTC 6 November, another ship **Mette Maersk** (OXKT2) reported northeast winds of 45 kts while located near 14.5N 96.5W. The gale warning was upgraded to a storm warning at 1630 UTC 6 November based on a 1201 UTC 6 November QUIKSCAT pass, which indicated several 50 kts wind barbs at the 25 km resolution (***Figure 8***). Shortly after the

Event	Beginning	Ending
1*	1800 UTC 3 November	0000 UTC 10 November
2	1200 UTC 25 November	1800 UTC 26 November
3	1200 UTC 1 December	1200 UTC 4 December
4	0600 UTC 11 December	1800 UTC 12 December
5*	0600 UTC 14 December	1800 UTC 16 December
6*	0000 UTC 18 December	1200 UTC 21 December
7	0000 UTC 26 December	1800 UTC 30 December

Table 3. Estimated beginning and ending times for Gulf of Tehuantepec gale and storm events from July through December, 2004. Storm events are denoted with an asterisk (*).

upgrade to a storm event, another ship, the **HMI Brenton Reef** (WCY8453), reported northerly winds of 40 kts and 4 m (14 ft) seas while located near 14.5N 94.3W. The ship was traversing westward through the high wind swath and reported northeast winds of 40 kts six hours later while located near 15N 95.5W. At 1200 UTC 8 November, the **Paris Express** (DIHE) reported northeasterly winds of 40 kts and seas of 4.5 m (15 ft) near 14N 95.5W. The last ship report of gale force winds was at 1200 UTC 9 November when the ship **Aida** (SCFI) reported 35 kts winds near 13N 95W. Six hours later, the winds had dropped off to 30 kts as the ship progressed westward to near 14N 96.7W.

The second wind event was of much shorter duration, lasting only 30 hours from 1200 UTC 25 November to 1800 UTC 26 November. A 1209 UTC QUIKSCAT pass indicated 35–40 kts winds at the head of the Gulf of Tehuantepec. The next pass around 0041 UTC 26 November detected a small area of 35 kts winds in the Gulf of Tehuantepec.

The next wind event commenced a week later around 1200 UTC 1 December and lasted about 72 hours. As in the previous event, scatterometer data barely indicated gale force winds for the two passes, at 1202 UTC 2 December and 1202 UTC 3 December. At 1800 UTC 1 December, the **Star Harmonia** (LAGB5) located near 14.5N 95W reported north-northeast winds of 35 kts and seas of 4.5 m (15 ft). This was the only ship report during this event.

The fourth wind event for the Gulf of Tehuantepec began around 0600 UTC 11 December and continued until 1800 UTC 12 December. An 1155 UTC 11 December QUIKSCAT pass indicated 35 kts winds in the area. A later pass at 0026 UTC 12 December indicated 35–40 kts winds. At 1800 UTC 11 December, **Zim Israel** (4XGX) reported north-northeast winds of 40 kts and a combined sea of 4.5 m (15 ft) while located near 14N 96.3W. Six hours later, the same ship reported north winds of 40 kts and 4.5 m (15 ft) seas as it traversed eastward to near 13.7N 94.5W.

The fifth wind event of the 2004–2005 Gulf of Tehuantepec season began at 0600 UTC 14 December and continued until 1800 UTC 16 December. This event was the first of two consecutive storm events to occur in mid-December. A 1217 UTC 14 December QUIKSCAT Pass indicated 50 kts winds in the Gulf of Tehuantepec. Subsequent passes at 0049 UTC and 1151 UTC 15 November indicated a larger area of 50 kts winds in the Gulf of Tehuantepec region. The only ship report of gale force winds was on 1200 UTC 14 December when the **Dagmar Maersk** reported 35 kts winds and 3 m (10 ft) seas while located near 13N 97W. The next storm event came quickly on the heels of the first, commencing near 0000 UTC 18 December and continuing for 84 hours until 1200 UTC 21 December. 35 kts winds were indicated on the 1214 UTC 18 December QUIKSCAT pass. The only ship report of gale force winds or greater during this event came from the **Green Point** (WCY4148) at 1200 UTC 20 December. The ship reported north-northeasterly winds of 40 kts but no sea heights while located near 13.5N 95W. Six hours later the same ship traversed into the heart of the high wind swath near 14N 96W and reported winds of 45 kts and seas of 5 m (16 ft).

The last wind event for the calendar year 2004 began around 0000 UTC 26 December and was associated with strong high pressure which built southward over the Gulf of Mexico in the wake of the historic Christmas snow event on the Texas coast (see Atlantic section). This event lasted for more than 4 days before ending at 1800 UTC 30 December. The 1207 UTC 26 December QUIKSCAT pass indicated 50 kts winds. Subsequent passes at 0038 UTC and 1141 UTC 27 December indicated winds had decreased to 40–45 kts. There were quite a number of ship reports associated with this last event. The first was the ship **Manon** (SIWN), located near 13ON 94OW, which reported north-northwest winds of 40 kts at 0600 UTC 28 December. Six hours later, the **Manon** reported winds of 45 kts as it traversed westward to near 14N 95.5W. At 1800 UTC 28 December, the ship **Hansa Stockholm** (ELUA3) reported east-northeast winds of 35 kts and 5 m (17 ft) seas while located near 12N 98W.

MEAN CIRCULATION HIGHLIGHTS AND CLIMATE ANOMALIES
September through December 2004

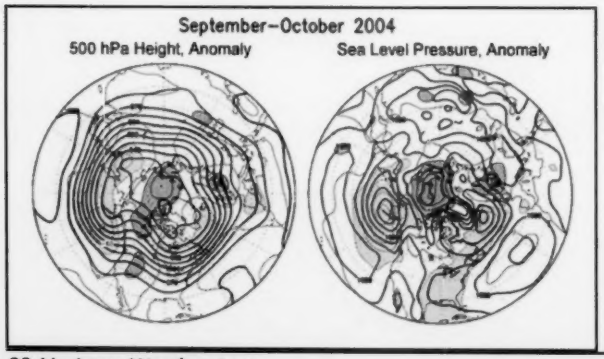
A. James Wagner, Senior Forecaster, Climate Operations Branch, Climate Prediction Center /NCEP/NWS/NOAA.

SEPTEMBER - OCTOBER 2004

The circulation pattern over the Northern Hemisphere during September and October was characterized by a stronger than normal 500 hPa ridge over western North America extending over the Arctic Basin. Middle tropospheric heights were below normal across northern portions of both the Atlantic and Pacific Oceans, producing stronger than normal middle latitude westerlies across both oceans. This two-month average obscured a rather dramatic change over the Atlantic in which the westerlies were far north of normal during September, north of a very strong Bermuda–Azores High, while during October below normal heights developed over subtropical latitudes. The strong high collapsed, and blocking developed over high latitudes of the Atlantic. A slightly stronger than normal ridge was located over northern Europe to the northeast of a somewhat amplified trough over the Iberian Peninsula for the two-month period in the mean. This trough was primarily a feature of the October circulation and was associated with some strong storms that struck parts of Western Europe during that month.

The generally weak mean 500 hPa height anomalies over most of the U.S. for the two-month period were associated with changeable weather patterns over North America. During September temperatures were substantially below normal over Alaska for the first time in several months, but by October they had returned to above normal levels. Over the CONUS, temperatures averaged above normal in September over the Northeast and the Central States, but were near to slightly below normal over the West and Southeast. By October, the greatest relative warmth had shifted to the upper Midwest and the southern and southeastern States, with near normal averages over the Northeast and slightly below normal over the Southwest.

Precipitation patterns showed even stronger changes from September to October, with a sudden end to the excessively heavy rains over the eastern U.S. from three landfalling hurricanes, two of them major, that struck Florida in September, while a strong trough that developed in late October near the West Coast brought unusually heavy early season rains to California and parts of the Southwest. Wet conditions across the northern Great Plains in September gave way to a more normal pattern in October.



The Tropics

Conditions over the equatorial Pacific made a gradual transition to a weak El Nino, with moderately above normal temperatures developing across most of the region near the Equator. However, strongest positive anomalies of 1C or greater were generally confined to the area near the Date Line, and SSTs failed to go significantly above normal near the South American Coast, making it likely that this would be a central Pacific event rather than a Basin-wide El Nino. Climate impacts at middle latitudes are generally stronger with Basin-wide events than with central Pacific episodes.

The Atlantic hurricane season was unusually active, with most of the storms crowded into the two months of August and September. By the end of September, when the Atlantic tropical activity abruptly ceased due to the change in circulation mentioned previously, there had been twelve tropical storms, or which eight were hurricanes and six attained major hurricane status. Circulation patterns and SSTs over the tropical Atlantic Basin all favored above normal activity this year, continuing the trend that began in 1995.

Although eastern Pacific tropical activity had been below normal this season, typhoons were active over the western Pacific, with a record ten striking Japan during the whole season through the end of October.

NOVEMBER - DECEMBER 2004

During the late fall months of November and December, an abnormally strong ridge persisted over western Canada, which together with a deeper than normal low over the Arctic basin to the north and northwest continued the spell of unusually mild weather over Alaska, interrupted only by a cooler than normal September. A stronger than normal trough over the eastern Pacific continued to steer unusually strong storms for so early in the season into the southwestern U.S. The two-month average again obscures important differences in the two months, as in November the trough was more of a low latitude feature near Baja California that steered moist air from the tropics northeastward across New Mexico and Texas, producing heavy rainfall from there into the southeastern part of the U.S.

November temperatures averaged above normal over the middle Atlantic area and over most of the northern and central parts of the country, while it was abnormally dry across the northern tier of states from the Pacific Northwest to the upper Mississippi Valley.

During December however, the trough redeveloped near the California coast, brining a resumption of heavy rains to the Southwest, with heavy snows in the higher elevations of both the Sierras and the coastal ranges. Very little true Arctic air was in evidence, except for a brief cold wave in the eastern U.S. in the latter half of December. A slightly stronger than normal trough over eastern North America brought near to slightly below normal temperatures to most of the eastern third of the U.S., while the Pacific Northwest, Great Basin, and most of the Great Plains enjoyed relatively mild weather. Although the unusually heavy precipitation in the Southwest helped to relieve long-term drought in that area, the rainy season did not yield much precipitation over the Pacific Northwest and the northern Rockies, which continued in long-term drought with little relief. Conditions also continued on the dry side over much of the Great Plains and Mississippi Valley.

The Tropics

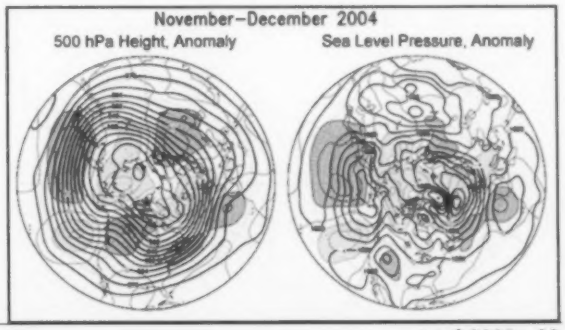
Although weak El Nino conditions continued to prevail over the equatorial Pacific, temperatures were not high enough to trigger the anomalous convection along the equator east of the Date Line that is often seen in stronger events. Throughout most of the boreal summer into the fall, convection was concentrated along a pronounced ITCZ near 10 N, but did not take on an El Nino configuration, with the maximum near the equator. It should also be noted here, due to a popular misconception, that the heavy precipitation that had triggered mudslides in some locations over southern California was not due to the weak El Nino but to an unusual mid-latitude circulation pattern that produced a strong trough near the California coast. By late December, the intensity of the Madden-Julian waves began to pick up again, and these systems moving slowly eastward through the equatorial belt or the eastern Indian Ocean and western Pacific were tending to override any influence of the weak El Nino, giving variable forcing and contributing to frequent changes in the middle latitude circulation over the Pacific and North America.

The typhoon season remained active over the southwestern Pacific, where tropical cyclone development continued to be favored by deep easterlies south of the stronger than normal subtropical ridge over most of the western and central Pacific. The storms remained at low latitudes, affecting the Philippines and Southeast Asia primarily in November, but giving Japan a welcome respite.

Figure legends and description of units:

The charts on the left show the seasonal mean 500 hPa height contours at 60 m intervals in heavy solid lines, with alternate contours labeled in decameters (dm). Positive height anomalies are contoured in light solid lines at 30 m intervals, and light dashed lines show negative height anomalies. Areas of mean height anomalies more than 30 m above normal have heavy shading, and areas of mean height anomalies more than 30 m below normal have light shading.

The charts on the right show the seasonal mean sea level pressure (SLP) at 4 hPa intervals in heavy solid lines, labeled in hPa at selected intervals. Anomalies of SLP are contoured in light lines at 2 hPa intervals, with dark shading and solid lines in areas more than 2 hPa above normal, and light shading with dashed lines in areas greater than 2 hPa below normal.



Atlantic Regional News

Sergio Marsh (on right), the NOAA VOS Eastern Region manager, presents a ten-year service award to Peter Gibino (on left), the Port Meteorological Officer in Norfolk, Virginia.

VOS Program Awards

The *Hatsu Envoy* received a 2003 VOS Award for outstanding performance. Pictured left to right are Second Mate Lin Wen-Yu, Chief Mate Chiang Cheng-Huei, Captain Chen Ma-Li, and Third Mate Tsen Po-Hsun.

The *Selma Kalkavan* received a VOS award for outstanding performance. Receiving the award pictured left to right are Master Hayri Afkan, 2nd Officer Ozan Koseoglu, 3rd Officer Erkan Kalkavan, and Chief Officer Gultekin Ergunay.

The *Westwood Ranier* received a 2003 VOS Award for outstanding performance. Pictured left to right, Second Mate Elmer Sagang, Captain Arun Bhatnagar, Third Mate Ian Rubio and Third Mate Lorenzo Miranda.

In 2002, The Crowley Tug *Seneca* received their third award in a row. They use both e-mail and HF radio to transmit their weather observations to the National Weather Serivce Alaska Region. In 2002 their total observations were 751 increasing from the two previous award years.

Tim Kenefick, PMO Charleston South Carolina, presented a VOS award in 2003 to Master James Carbone onboard the *Horizon Hawaii.*

The *Lykes Liberator* received their first VOS award. The crew provided over 560 marine observations during 2003. Congratulations are well deserved. Pictured left to right receiving the award are Capt Jeff Bridges, Chief Mate Dan Martin, and 2nd Mate Danny Duzich. Other crew members that made contributions were Capt Dave Sulin, Capt Russ Davis, Chief Mate Sean McNeice, 2nd Mate Billy Young, 2nd Mate Steve Watt, 2nd Mate Anthony Colla, 2nd Mate Keith Restle, 3rd Mate Mike Carlisle, and 3rd Mate Charles Booher.

U.S. Coast Guard Broadcast Notice to Mariners

Important Notice to Mariners

The following is a quote from U.S. Coast Guard Broadcast Notice to Mariners, Date-Time Group R 141643Z Dec 04:

Effective 010001Z Jan 05 Coast Guard Long Range Communications Facilities will change their Single Sideband Voice radio guard to the following frequencies: 4125, 6215, 8291, 12290. Frequencies are carrier frequencies and in Kilohertz. Emission is single sideband (upper sideband).

These frequencies are intended for initial voice contact and distress alerts and working only. Follow on working frequencies if necessary shall be by mutual agreement after initial contact. There are no changes to Marine Safety Information Broadcast frequencies or schedules.

National Weather Service VOS Program New Recruits From November 1, 2004 through February 28, 2005

Name of Ship	Call	Agent Name	Recruiting PMO
ADMIRALTY WIND	WCY7687	ADMIRALTY WIND C/O FOUR SEASONS TOURS	ANCHORAGE, AK
AKASHI BRIDGE	H3QM	AKASHI BRIDGE C/O K LINE CO.	ANCHORAGE, AK
AKINADA BRIDGE	H9PN	AKINADA BRIDGE C/O K LINE CO.	ANCHORAGE, AK
ALIANCA SHANGHAI	A8CQ5	C/O NWS (PMO) GALLIA NAVIGATION LTD	NEW YORK CITY, NY
APL AUSTRALIA	A8FS8	HANSA SHIPPING GMBH	NEW YORK CITY, NY
APL SCOTLAND	9VDD3		SEATTLE, WA
APL SWEDEN	9VYY5	JIM SCHEELS	SEATTLE, WA
ARAL SEA	S6CD2	MORAN GULF SHIPPING	HOUSTON, TX
BAUHINIA BRIDGE	VRZZ5	BAUHINIA BRIDGE C/O K LINE CO.	ANCHORAGE, AK
BRISTOL LEADER	WCY6985	BRISTOL LEADER C/O STERLING SERVIS	KODIAK, AK
CANMAR HONOUR	ZCBP5	CANMAR HONOUR C/O OOCL USA INC.	ANCHORAGE, AK
CANMAR PRIDE	ZCBP6	CANMAR PRIDE C/O OOCL USA INC.	ANCHORAGE, AK
CANMAR SPIRIT	MAHG5	CANMAR SPIRIT C/O OOCL USA INC.	ANCHORAGE, AK
CANMAR VENTURE	VQLL5	CANMAR VENTURE C/O OOCL USA INC.	ANCHORAGE, AK
CAPE LILA	3EMQ9	CAPE LILA C/O K LINE AMERICA	ANCHORAGE, AK
CARNIVAL VALOR	H3V3	CARNIVAL CRUISE LINE - BRIDGE	MIAMI, FL
CAST PREMIER	ZCDH7	SHIP CAST PREMIER C/O CAST USA	ANCHORAGE, AK
CAST PROSPECT	ZCBD3	CANMAR FORTUNE C/O OOCL USA INC.	ANCHORAGE, AK
CHESAPEAKE BAY BRIDGE	V7FW8	MS SILVA SCHIFFAHARTES MBH CO	NEW YORK CITY, NY
CONDOR	PJWQ	KENNETH WONG	NEW YORK CITY, NY
CORONA ACE	3FFP4	CORONA ACE C/O NWS	ANCHORAGE, AK
CROSS POINT	WDA3423	CROSS POINT C/O NORTHLAND	KODIAK, AK
CSCL CHIWAN	P3CE9	CSCL CHIWAN C/O SEASPAN	ANCHORAGE, AK
CSCL FELIXSTOWE	P3KM9	CSCL FELIXSTOWE C/O SEASPAN	ANCHORAGE, AK
CSCL FUZHOU	ELYA7	CSCL FUZHOU C/O SEASPAN	ANCHORAGE, AK
CSCL LOS ANGELES	A8AX8	CSCL LOS ANGELES C/O SEASPAN	ANCHORAGE, AK
CSCL NINGBO	P3GT9	CSCL NINGBO C/O SEASPAN	ANCHORAGE, AK
DAIO ANDES	3FDN9	DAIO ANDES C/O NWS	ANCHORAGE, AK
DIRECT CONDOR	A8AL3	DIRECT CONDOR C/O CAST USA	ANCHORAGE, AK
DIRECT JABIRU	A8CF4	DIRECT JABIRU C/O CAST USA	ANCHORAGE, AK
DIRECT KEA	ELVZ7	DIRECT KEA C/O CAST USA	ANCHORAGE, AK
DIRECT KESTREL	A8ET9	DIRECT KESTREL C/O NWS	ANCHORAGE, AK

Name of Ship	Call	Agent Name	Recruiting PMO
EVER REPUTE	3FRZ4	EVERGREEN AMERICA CORP	NEW YORK CITY, NY
EVER UNIFIC	3FGB9	EVER UNIFIC C/O EVERGREEN INTERNATIONAL	ANCHORAGE, AK
EVER USEFUL	3FCC9	EVER USEFUL C/O EVERGREEN INTERNATIONAL	ANCHORAGE, AK
EXPLORER OF THE SEAS	ELWX5	RCCL	MIAMI, FL
FALCON ARROW	C6TK8	FALCON ARROW C/O NWS	ANCHORAGE, AK
FEDERAL HUNTER	VRWP2	ANGLO EASTERN SHIP MANAGEMENT LTD	NEW ORLEANS, LA
FREDERICK BOUCHARD	WYT9297	FREDERICK BOUCHARD C/O NWS	KODIAK, AK
GENOA BRIDGE	HOMF	GENOA BRIDGE C/O K LINE CO.	ANCHORAGE, AK
GOLDEN GATE BRIDGE	H9HU	GOLDEN GATE BRIDGE C/O K LINE CO.	ANCHORAGE, AK
GREAT PACIFIC	WBD7567	GREAT PACIFIC C/O NWS KODIAK	KODIAK, AK
GREBE ARROW	C6OM7	GREBE ARROW C/O JEBSENS INTL USA	ANCHORAGE, AK
HANJIN AMSTERDAM	DHDH	HANJIN AMSTERDAM C/O NWS	ANCHORAGE, AK
HANJIN BASEL	DHPU	HANJIN BASEL C/O HANJIN USA COSCO	ANCHORAGE, AK
HANJIN BRUSSELS	DIGW	HANJIN BRUSSELS C/O COSCO	ANCHORAGE, AK
HANJIN CHICAGO	A8CI2	HANJIN CHICAGO C/O COSCO	ANCHORAGE, AK
HANJIN LISBON	A8BV2	HANJIN LISBON C/O COSCO	ANCHORAGE, AK
HANJIN MADRID	DHQS	HANJIN MADRID C/O COSCO	ANCHORAGE, AK
HANJIN PHOENIX	A8CN9	HANJIN PHOENIX C/O COSCO	ANCHORAGE, AK
HANJIN PORTLAND	A8FS5	V-SHIPS GMBH & CO. KG	NEW YORK CITY, NY
HANJIN PRETORIA	A8CP6	HANJIN PRETORIA C/O COSCO	ANCHORAGE, AK
HANSA NARVIK	DINJ	HANSA NARVIK C/O NWS	ANCHORAGE, AK
HANSA VISBY	ELWR5	HANSA VISBY C/O NWS	ANCHORAGE, AK
INDOTRANS MAKASSA	VRZO2	CHINA NAVAGATION 9TH FLOOR EAST WING WARWICK HOUS	NEW ORLEANS, LA
INSPIRATION	C6FM5	INSPIRATION C/O ALASKA MARITIME	ANCHORAGE, AK
JAMES RIVER BRIDGE	H9LW	JAMES RIVER BRIDGE C/O K LINE CO.	ANCHORAGE, AK
JERVIS BAY	MQPF2	JERVIS BAY C/O P & O NEDLLOYD	ANCHORAGE, AK
LIONS GATE BRIDGE	H9LV	LIONS GATE BRIDGE C/O K LINE CO.	ANCHORAGE, AK
LYKES HERO	ZCBN5	LYKES HERO C/O LYKES LINES LTD LLC	ANCHORAGE, AK
M/V EIJIN	3FDQ5	INCHCAPE SHIPPING JACKSONVILLE	JACKSONVILLE, FL
M/V JEAN ANNE	WCD3786	PASHA HAWAII TRANSPORT LINES	NEW ORLEANS, LA
MAERSK DOUALA	A8FC9	MAERSK SEALAND LTD	CHARLESTON, SC
MAERSK GARONNE	FWAB	MAERSK SEALAND INC	CHARLESTON, SC
MAERSK PECEM	V2OU9	MAERSK-SEALAND LTD	CHARLESTON, SC
MAERSK TOLEDO	MZOJ8		SEATTLE, WA
MOL CALLAO	MXMM5	MOL CALLAO C/O MOL AMERICA	ANCHORAGE, AK
MOL EFFICIENCY	HOZY	MOL EFFICIENCY C/O MOL AMERICA INC.	ANCHORAGE, AK
MOL EXCELLENCE	HPEF	MOL EXCELLENCE C/O MOL AMERICA INC.	ANCHORAGE, AK
MOL OASIS	3ENO4	MOL OASIS C/O MOL AMERICA INC	ANCHORAGE, AK
MOL WELLINGTON	H9TO	MOL WELLINGTON C/O MOL AMERICA INC.	ANCHORAGE, AK
MSC BELEM	VRUV9	MEDITERRANEAN SHIPPING CO	CHARLESTON, SC
MSC DONATA	A8EU2	MSC DONATA C/O MEDITERRANEAN SHIPPING CO.	ANCHORAGE, AK
MSC JADE	H3ZP	C/O NWS (PMO) PACIFIC MARINE SERVICES LTD	NEW YORK CITY, NY
MSC NERISSA	H3LP	MSC (USA) INC.	NEW YORK CITY, NY
NORASIA ATLAS	A8FR9	PETER DOHLE SCHIFFSBETILIGUNGS-KG (GBMH & CO)	NEW YORK CITY, NY
NORDEAGLE	P3KE8	NORDEAGLE SHIPPING CO LTD	NEW YORK CITY, NY
NORWEGIAN DREAM	C6LG5	QUAY CRUISE AGENCY	NEW ORLEANS, LA

Name of Ship	Call	Agent Name	Recruiting PMO
OCEAN TITAN	WDB9647	OCEAN TITAN C/O WESTERN TOWBOAT	ANCHORAGE, AK
OLGA MAERSK	OXBB2	KERR NORTON STRACHAN AGENCY	NEW YORK CITY, NY
OOCL CHICAGO	VRWQ2	OOCL CHICAGO	ANCHORAGE, AK
OOCL CHINA	VRWE7	OOCL CHINA	ANCHORAGE, AK
OOCL FRANCE	ELZB5	OOCL FRANCE C/O OOCL USA INC.	ANCHORAGE, AK
OOCL HAMBURG	VRZK9	OOCL HAMBURG	ANCHORAGE, AK
OOCL JAPAN	VRWB7	OOCL JAPAN	ANCHORAGE, AK
OOCL KOREA	DMRG	OOCL KOREA C/O OOCL USA INC.	ANCHORAGE, AK
OOCL NEW YORK	DPAK	OOCL NEW YORK	ANCHORAGE, AK
OOCL NINGBO	VRZL3	OOCL NINGBO	ANCHORAGE, AK
OOCL ROTTERDAM	VRZK8	OOCL ROTTERDAM C/O OOCL USA INC.	ANCHORAGE, AK
OOCL SHANGHAI	ELXT8	OOCL SHANGHAI C/O OOCL USA INC	ANCHORAGE, AK
P & O NEDLLOYD ALGOA	DBUZ	P & O NEDLLOYD ALGOA	ANCHORAGE, AK
P & O NEDLLOYD ANDES	ELYY5	P & O NEDLLOYD ANDES	ANCHORAGE, AK
P & O NEDLLOYD KOBE	MYJM3	P & O NEDLLOYD KOBE	ANCHORAGE, AK
P & O NEDLLOYD VESPUCCI	DBUT	P & O NEDLLOYD VESPUCCI	ANCHORAGE, AK
PACIFIC RAVEN	WDB7583	PACIFIC RAVEN C/O SEA COAST TOWING	KODIAK, AK
POTOMAC BRIDGE	A8CI9	POTOMAC BRIDGE C/O NWS	ANCHORAGE, AK
RAINBOW WING	3FIQ7	RAINBOW WING C/O NWS	ANCHORAGE, AK
REDEEMER	WDA84	32 REDEEMER C/O MAGONE MARINE	KODIAK, AK
RUFF & REDDY	WY4096	RUFF & REDDY C/O NWS	KODIAK, AK
S/R BRISTOL BAY	WDA7033	SEARIVER BRISTOL BAY	VALDEZ, AK
SEABULK MARINER	WCY7053	SEABULK MARINER C/O ALASKA MARITIME	KODIAK, AK
SILKEBORG	EIJV	BIEHL CO.	HOUSTON, TX
SILVER SPRAY	WAO9040	SILVER SPRAY C/O NWS	KODIAK, AK
SNOW DRIFT	ZCGL3	SNOW DRIFT C/O CAST USA INC.	ANCHORAGE, AK
SWIFT ARROW	C6NI7	SWIFT ARROW C/O COSCO	ANCHORAGE, AK
TAIO FRONTIER	3EZF5	TAIO RAINBOW C/O NWS	ANCHORAGE, AK
TMM JALISCO	ZCDJ7	TMM J ALISCO C/O TMM	ANCHORAGE, AK
TYCO DURABLE	V7DI8	CS TYCO DURABLE - TRANSOCEANIC CABLE SHIP CO.	BALTIMORE, MD
USNS MAJ STEVEN W PLESS	WHAU	CAPTAIN	JACKSONVILLE, FL
VALENCIA BRIDGE	HOUU	VALENCIA BRIDGE C/O K LINE AMERICA	ANCHORAGE, AK
VANCOUVER BRIDGE	H8FE		SEATTLE, WA
VIRGINIA BRIDGE	HOKP	VIRGINA BRIDGE C/O K LINE AMERICA	ANCHORAGE, AK
WESTWOOD OLYMP	IA C6UB2		SEATTLE, WA
ZIM MEDITERRANEAN	4XFX	ZIM MEDITERRANEAN C/O ZIM AMERICAN SHIPPING	KODIAK, AK
ZIM PIRAEUS	SZJP	ZIM-AMERICAN ISRAELI SHIPPING CO.	NEW YORK CITY, NY
ZIM SHENZHEN	VQUQ4	ZIM-AMERICAN ISRAELI SHIPPING CO.	NEW YORK CITY, NY

Another great recruiting period
116 New Recruits—Way to Go and Welcome Aboard!—Luke

2004 VOS Outstanding Performers

SHIP AWARD WINNERS

ALBEMARLE ISLAND
APL JAPAN
APL SINGAPORE
ARCTIC SUN
BARBARA ANDRIE
BARENTS SEA
BARRINGTON ISLAND
BERNARDO QUINTANA A
CANMAR PROMISE
CAP SAN ANTONIO
CHESAPEAKE BAY
CHIQUITA DEUTSCHLAND
COASTAL RELIANCE
DELAWARE BAY
DISCOVER DEEP SEAS
DUNCAN ISLAND
EDYTH L
EL YUNQUE
ENTERPRISE
EXPLORER OF THE SEAS (WEATHER LAB)
GEYSIR
GSF EXPLORER
HARMONY ACE
HMI BRENTON REEF
HOOD ISLAND
HORIZON ANCHORAGE
HORIZON CHALLENGER
HORIZON CRUSADER
HORIZON DISCOVERY
HORIZON HAWAII
HORIZON KODIAK
HORIZON PACIFIC
HORIZON PRODUCER
HORIZON RELIANCE
HORIZON TACOMA
JAG PRAKASH
KENAI
KENNICOTT
LIBERTY STAR
LNG LEO
LYKES DISCOVERER
LYKES LIBERATOR
LYKES NAVIGATOR
M/V FREEDOM

SHIP AWARD WINNERS

M/V JAMES R. BARKER
M/V LIBERTY
MACKINAC BRIDGE
MAERSK CAROLINA
MARTORELL
MCKEE SONS
MESABI MINER
MIDNIGHT SUN
NOAA SHIP ALBATROSS IV
NOAA SHIP DELAWARE II
NOAA SHIP GORDON GUNTER
NOAA SHIP NANCY FOSTER
NOAA SHIP OREGON II
NOAA SHIP RONALD BROWN
NORTH STAR
NORWEGIAN SEA
PACIFIC CHALLENGER
PARAGON
PITTSBURG
POLAR EAGLE
POLAR RESOLUTION
PRESIDENT POLK
ROGER REVELLE
SAUDI TABUK
SEA PRINCE
SEABULK MONTANA
SEALAND COMMITMENT
SEALAND EXPRESS
SEALAND INTEGRITY
SEALAND MOTIVATOR
SEALAND PRIDE
SEALAND VOYAGER
SELMA KALKAVAN
SENECA
SINUK
SIOUX
SOLAR WING
TAUSALA SAMOA
TUSTUMENA
WESTWOOD MARIANNE
WESTWOOD VICTORIA
WILFRED SYKES
WOLDSTAD
WORLD SPIRIT

VOS Cooperative Ship Report: January through December 2004

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1ST LT HARRY L. MARTIN	NDFH	Jacksonville	0	18	70	10	27	17	16	25	0	4	8	2	197
2ND LT JOHN P. BOBO	WJKH	Norfolk	0	0	0	21	32	1	5	4	31	34	21	41	190
A.P. MOLLER	OVYQ2	Seattle	0	44	18	0	0	0	0	0	0	0	0	0	62
ADVANTAGE	WPPO	Norfolk	0	0	0	0	34	65	0	10	10	0	37	25	181
AGNES FOSS	WYZ3112	Kodiak	0	4	16	7	13	16	16	7	8	28	0	0	115
AKASHI BRIDGE	H3QM	Anchorage	0	0	0	0	0	0	0	0	0	0	0	12	12
ALASKA MARINER	WSM5364	Anchorage	1	0	0	10	0	0	0	0	3	0	0	0	14
ALASKA SPIRIT	WCC5414	Kodiak	0	0	0	0	0	0	0	0	0	3	0	0	3
ALASKAN LEADER	WDB7918	Kodiak	0	0	0	0	0	0	0	31	39	87	85	40	282
ALBEMARLE ISLAND	C6LU3	Miami	53	43	41	18	32	18	30	32	19	37	28	16	367
ALERT	WCZ7335	Valdez	0	0	0	0	0	0	0	3	1	23	17	29	73
ALKIN KALKAVAN	TCQP	Norfolk	0	0	0	6	34	38	21	9	17	8	0	0	133
ALPHA HELIX	WSD7078	Kodiak	0	0	5	0	35	3	21	0	3	0	0	0	67
ALTAIR VOYAGER	C6OK	Baltimore	84	53	36	34	30	32	88	41	55	28	2	15	498
AMSTERDAM	PBAD	Anchorage	0	0	0	0	0	0	0	0	0	26	8	25	59
ANASTASIS	9HOZ	Miami	0	0	5	0	0	2	3	0	1	13	5	0	29
APL ALMANDINE	9VBS	Norfolk	0	0	0	0	0	10	17	11	16	8	23	11	96
APL AMAZONITE	9VBX	Long Beach	0	0	0	0	9	13	20	10	18	11	20	6	107
APL CHINA	WDB3161	Long Beach	40	41	58	48	54	54	52	73	41	65	58	21	605
APL DALIAN	S6HU6	Norfolk	0	0	0	0	0	0	0	0	0	43	3	4	50
APL JAPAN	S6TS	Seattle	74	99	98	95	67	104	88	112	91	95	57	68	1048
APL KENNEDY	9VAY4	Seattle	53	45	36	51	70	54	72	67	49	52	44	83	676
APL KOREA	WCX8883	Long Beach	15	15	19	22	35	24	27	9	28	43	21	22	280
APL PHILIPPINES	WCX8884	Long Beach	50	25	11	17	42	23	31	8	13	16	46	39	321
APL SINGAPORE	WCX8812	Long Beach	49	47	53	65	45	60	42	49	39	87	49	71	656
APL SPINEL	9VVK	Seattle	0	0	24	10	0	0	70	59	65	23	38	29	318
APL SWEDEN	9VYY5	Seattle	0	0	0	0	0	0	0	0	0	0	0	29	29
APL THAILAND	WCX8882	Long Beach	58	37	25	38	16	24	28	35	54	33	35	49	432
APL TURQUOISE	9VVY	Oakland	13	11	41	15	37	15	24	12	11	21	16	19	235
ARA J	V2JH	New Orleans	0	0	0	14	72	45	41	9	0	0	0	0	181
ARCTIC OCEAN	C6T2062	New York City	0	0	0	0	23	29	51	37	1	14	0	0	155
ARCTIC SUN	ELQB8	Anchorage	187	174	168	183	82	96	196	176	190	183	188	174	1997
ARGONAUT	KFDV	New York City	37	17	0	0	19	15	38	9	2	1	0	0	138
ARIZONA VOYAGER	KGBE	Miami	0	0	0	0	21	16	1	11	40	27	0	0	116
ARTHUR M. ANDERSON	WE4805	Chicago	49	0	3	42	21	40	55	54	45	24	37	14	384
ATLANTIC FOREST	WDB2122	New Orleans	37	26	2	0	3	5	25	20	1	22	18	15	174
ATLANTIC OCEAN	C6T2064	New York City	20	23	36	26	25	21	16	0	28	26	36	59	316
ATLANTIS	KAQP	Kodiak	0	0	0	7	5	8	8	0	0	0	6	8	42
ATTENTIVE	WCZ7337	Valdez	0	0	0	0	0	0	0	0	1	10	26	12	49
AURORA	WYM9567	Kodiak	17	12	0	0	0	4	24	30	16	0	0	0	103
AVIK	WDB7888	Anchorage	0	0	0	0	0	9	4	5	19	14	11	0	62
AWARE	WCZ7336	Valdez	0	0	0	0	0	0	6	6	4	6	13	17	52
AXEL MAERSK	OUUY2	Seattle	76	3	0	0	0	0	0	0	0	0	0	0	79
BARBARA ANDRIE	WTC9407	Chicago	0	0	0	6	6	0	0	0	3	5	0	0	20
BARENTS SEA	9VAP5	New York City	0	0	29	49	51	45	70	82	40	62	36	40	504
BARRINGTON ISLAND	C6QK	Miami	46	40	60	64	62	43	49	63	60	63	53	56	659

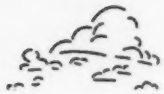
VOS Cooperative Ship Report

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
BARROW RESEARCH	KCB53	Anchorage	0	0	0	0	0	0	8	27	25	21	14	6	101
BAUHINIA BRIDGE	VRZZ5	Anchorage	0	0	0	0	0	0	0	0	0	0	0	56	56
BBC DENMARK	PJGA	New Orleans	0	0	0	0	0	0	0	17	0	0	0	0	17
BERING SEA	C6YY	Miami	0	0	13	22	21	3	0	0	7	0	12	7	85
BERNARDO QUINTANA A	C6KJ5	New Orleans	82	73	69	45	49	55	71	79	78	78	67	75	821
BESIRE KALKAVAN	TCAO	Norfolk	0	0	0	18	0	0	30	27	26	20	0	7	128
BIG VALLEY	WCX5558	Kodiak	0	0	0	0	0	0	0	0	0	14	1	0	15
BLARNEY	WBP4766	Kodiak	0	5	0	17	3	0	0	0	0	0	0	0	25
BLUE SKY	ELBX4	Baltimore	0	0	0	0	0	0	0	0	0	7	0	0	7
BLUEFIN	WQZ9646	Kodiak	0	0	0	0	0	0	0	1	0	0	0	0	1
BOUCHARD BOYS	WCY7761	Kodiak	12	12	0	0	0	0	0	0	0	1	18	0	43
BOWFIN	WSX7318	Kodiak	0	1	1	0	0	1	0	0	0	0	0	0	3
BRUCE	WWU8	Anchorage	36	23	26	25	28	24	23	24	25	19	25	25	303
BUCCANEER	WYW5588	Kodiak	0	0	0	0	0	0	0	1	7	21	8	2	39
BUCKEYE	WAQ3520	Chicago	0	0	0	0	0	0	0	0	0	0	3	7	10
BUFFALO SOLDIER	WWXB	Houston	0	21	13	0	69	0	20	24	2	36	36	4	225
BULWARK	WBN4113	Valdez	0	0	0	0	0	0	22	21	0	4	0	14	61
BURNS HARBOR	WDB4745	Chicago	4	0	0	11	3	0	0	0	3	21	21	17	80
CAJUN EXPRESS	ELXL3	Houston	0	0	0	0	0	0	0	16	14	7	1	0	38
CALIFORNIA JUPITER	ELKU8	Long Beach	0	5	0	0	0	0	0	0	0	0	0	0	5
CAMAI	WCY2272	Kodiak	0	0	0	0	0	0	0	0	17	11	1	6	35
CANMAR DYNASTY	VSXC4	Anchorage	0	0	0	0	0	0	0	4	25	13	1	10	53
CANMAR ENDURANCE	ZCBE7	Houston	0	0	0	0	0	0	0	0	0	0	8	20	28
CANMAR FORTUNE	ZCBD3	Anchorage	0	0	0	0	0	0	0	0	0	0	8	23	31
CANMAR HONOUR	ZCBP5	Anchorage	0	0	0	0	0	0	0	0	0	0	6	32	38
CANMAR PRIDE	ZCBP6	Anchorage	0	0	0	0	0	0	0	0	0	0	12	38	50
CANMAR PROMISE	ELXZ9	Anchorage	0	0	0	0	0	0	0	57	44	76	83	89	349
CANMAR SPIRIT	MAHG5	Anchorage	0	0	0	0	0	0	0	0	0	0	2	9	11
CANMAR VENTURE	VQLL5	Anchorage	0	0	0	0	0	0	0	0	0	0	6	12	18
CAP DOUKATO	A8EW3	Charleston	0	0	0	0	0	0	0	0	0	35	11	31	77
CAP SAN ANTONIO	ELZU6	Norfolk	15	13	7	12	22	21	32	22	16	13	23	22	218
CAPE TRINITY	KAFD	Houston	0	0	0	0	0	0	0	6	0	0	0	0	6
CAPE VINCENT	KAES	Houston	0	42	36	55	1	0	0	0	0	0	0	15	149
CAPT LES EASOM	WTT8587	Kodiak	2	0	0	0	3	0	6	1	0	0	0	17	29
CAPT STEVEN L BENNETT	KAXO	New Orleans	8	0	10	5	3	0	2	3	3	5	13	3	55
CARIBBEAN MERCY	3FFU4	Miami	2	0	0	1	0	0	0	0	15	0	0	0	18
CARIBBEAN PRINCESS	ZCDG8	Anchorage	0	0	0	0	0	0	0	0	0	8	71	67	146
CARNIVAL CONQUEST	3FPQ9	New Orleans	12	8	12	10	15	8	8	8	9	0	0	0	90
CARNIVAL DESTINY	C6FN4	Miami	0	0	0	0	0	0	0	0	4	13	9	15	41
CARNIVAL FANTASY	H3GS	Jacksonville	0	4	7	3	8	8	6	0	0	0	0	0	36
CARNIVAL GLORY	3FPS9	Jacksonville	34	22	24	5	12	18	27	21	19	21	20	5	228
CARNIVAL LEGEND	H3VT	Miami	0	0	0	0	11	1	0	0	0	0	0	0	12
CARNIVAL PARADISE	3FOB5	Miami	19	14	12	1	8	13	9	7	7	0	0	0	90
CARNIVAL PRIDE	H3VU	Miami	0	3	8	2	3	0	7	11	6	2	3	3	48
CARNIVAL TRIUMPH	C6FN5	Miami	0	0	0	2	12	11	14	20	6	12	8	17	102
CARNIVAL VICTORY	3FFL8	Miami	9	12	8	0	25	28	25	27	18	9	18	24	203
CASON J. CALLAWAY	WE4879	Chicago	1	0	3	45	36	4	24	19	16	17	6	49	220
CAST PREMEIR	ZCDH7	Anchorage	0	0	0	0	0	0	0	0	0	0	11	45	56
CELEBRATION	H3GQ	Jacksonville	19	19	26	0	0	2	5	12	11	11	5	8	118
CELINE	HBEF	New York City	0	0	0	0	0	0	0	3	8	16	12	0	39

VOS Cooperative Ship Report

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
CELTIC SEA	C6RT	Miami	81	57	64	19	0	0	0	0	29	30	18	29	327
CENTURY HIGHWAY #2	3EJB9	Long Beach	0	0	0	0	0	0	0	17	18	15	14	18	82
CHANG JIANG BRIDGE	3EZJ9	Seattle	56	42	48	54	36	21	63	67	49	48	72	68	624
CHARLES ISLAND	C6JT	Miami	25	0	0	1	40	40	42	51	53	27	28	17	324
CHARLES M. BEEGHLEY	WL3108	Chicago	0	0	0	0	0	0	0	0	13	29	17	21	80
CHARLESTON	WBVY	Houston	0	0	0	0	0	0	0	0	0	12	6	3	21
CHARLOTTE MAERSK	OWLD2	Seattle	0	55	9	0	30	17	0	56	15	0	0	0	182
CHASTINE MAERSK	OZZB2	Seattle	0	0	57	25	0	0	0	6	0	0	0	0	88
CHELSEA	KNCX	Miami	0	0	0	0	0	0	0	0	0	2	0	0	2
CHEMICAL EXPLORER	KRGC	Houston	16	13	10	15	12	0	8	10	17	14	9	26	150
CHEMICAL PIONEER	KAFO	Houston	16	1	21	27	5	0	2	4	0	0	0	0	76
CHEMICAL TRADER	KRGJ	Houston	0	0	0	0	0	0	0	0	0	8	43	29	80
CHESAPEAKE BAY	WMLH	Norfolk	42	70	44	24	31	51	22	21	33	39	27	24	428
CHEVRON LONDON	ELYX	Seattle	0	0	5	7	2	0	3	0	0	0	0	0	17
CHIEF GADAO	WEZD	Oakland	0	0	2	0	0	0	0	0	0	0	0	0	2
CHINOOK	WCY2791	Kodiak	7	0	0	0	0	0	0	0	0	0	0	0	7
CHIQUITA BELGIE	C6KD7	Baltimore	53	52	60	52	43	28	41	48	34	37	27	30	505
CHIQUITA BREMEN	ZCBC5	Miami	0	30	44	29	36	33	34	38	38	22	42	19	365
CHIQUITA DEUTSCHLAND	C6KD8	Baltimore	78	57	76	60	66	62	61	50	47	63	54	56	730
CHIQUITA ITALIA	C6KD5	Baltimore	48	57	50	48	58	45	45	42	51	48	42	49	583
CHIQUITA NEDERLAND	C6KD6	Baltimore	36	52	47	34	51	42	47	41	42	45	44	47	528
CHIQUITA SCANDINAVI	AC6KD4	Baltimore	66	43	55	48	50	50	65	63	33	53	67	62	655
CHIQUITA SCHWEIZ	C6KD9	Baltimore	49	41	44	17	37	38	42	48	49	52	48	46	511
CLEMENTINE MAERSK	OUQK2	Seattle	7	0	26	6	0	17	2	0	0	0	0	0	58
CLEVELAND	KGXA	Houston	85	48	8	45	35	51	54	45	57	34	50	27	539
CMA CGM KINGSTON	A8CS3	New York City	0	0	0	0	3	59	58	52	46	0	29	49	296
COASTAL EXPLORER	WCY3172	Kodiak	0	0	0	1	1	8	5	0	0	0	0	0	15
COASTAL MERCHANT	WCV8696	Seattle	0	0	0	2	0	2	5	0	0	5	0	0	14
COASTAL NAVIGATOR	WCY9686	Seattle	0	2	0	0	3	5	0	0	0	0	0	0	10
COASTAL PILOT	WBP7281	Kodiak	3	0	1	0	0	0	0	0	3	4	0	0	11
COASTAL RELIANCE	WADZ	Kodiak	17	8	13	40	43	13	66	31	55	61	42	79	468
COASTAL SEA	WCA7944	Seattle	0	0	3	0	3	4	0	0	0	0	0	0	10
COASTAL TRADER	WSL8560	Kodiak	0	0	1	1	0	0	0	1	0	0	0	0	3
COIN OF THE REALM	KL0YL	Kodiak	0	0	0	0	0	0	0	0	0	1	0	0	1
COLD BAY RESEARCH	KCI95	Anchorage	0	0	0	0	0	0	2	4	2	0	0	0	8
COLORADO VOYAGER	KLHZ	Oakland	13	9	1	11	13	23	14	0	3	0	1	2	90
COLUMBINE MAERSK	OUHC2	Seattle	0	65	2	0	29	0	0	0	8	9	0	0	113
COLUMBUS CANADA	P3RD8	Norfolk	22	18	21	17	29	3	6	5	0	0	0	0	121
COLUMBUS VICTORIA	P3RF8	Norfolk	21	12	21	16	19	59	71	65	60	64	41	47	496
CONTI MALACA	DGVZ	Norfolk	43	41	28	49	30	35	55	27	33	18	16	2	377
CONTSHIP ROME	ELVZ6	Norfolk	7	28	13	28	30	18	21	14	13	34	29	19	254
CORAL SEA	C6YW	Miami	0	0	26	11	14	11	10	24	15	19	21	19	170
CORBIN FOSS	WDB5265	Kodiak	0	9	0	1	0	0	0	0	0	0	0	0	10
CORMORANT ARROW	C6IO9	Seattle	52	25	5	27	26	23	23	5	20	14	42	0	262
CORNELIA MAERSK	OWWS2	Seattle	21	0	38	23	0	14	12	0	37	26	0	10	181
CORWITH CRAMER	WTF3319	Kodiak	0	0	0	0	0	0	0	0	0	27	38	59	124
COSCO NORFOLK	P3ZY6	Norfolk	6	4	2	12	14	33	29	30	26	16	23	14	209
COURTNEY L	ZCAQ8	Baltimore	0	13	7	7	31	30	42	39	49	41	41	36	336
CROSS POINT	WDA3423	Kodiak	0	0	0	0	0	0	0	0	0	0	16	0	16
CSCL FELIXSTOWE	P3KM9	Anchorage	0	0	0	0	0	0	0	0	0	0	0	9	9
CSCL NINGBO	P3GT9	Anchorage	0	0	0	0	0	0	0	0	0	0	0	9	9

VOS Cooperative Ship Report



Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
CSCL XIAMEN	A8CL6	Norfolk	10	15	28	26	0	0	0	0	0	0	0	0	79
CSL CABO	D5XH	Seattle	22	19	19	28	23	19	16	10	0	0	18	20	194
CYNTHIA FAGAN	KSDF	Houston	47	15	19	0	0	10	9	69	22	39	0	0	230
DAISHIN MARU	3FPS6	Seattle	0	0	0	0	0	0	0	0	0	0	54	16	70
DAWN PRINCESS	ZCBU2	Miami	0	0	0	0	0	0	0	18	10	17	19	52	116
DEEPWATER HORIZON	H3SM	Houston	50	115	81	28	55	67	63	78	141	53	142	140	1013
DEEPWATER MILLENNIUM	3FJA9	Houston	0	0	0	0	0	19	25	29	32	40	21	18	184
DEEPWATER PATHFINDER	HP9216	Houston	0	0	0	0	0	0	70	112	0	0	0	0	182
DELAWARE BAY	WMLG	Norfolk	21	8	12	27	30	29	18	23	21	28	36	37	290
DELAWARE BRIDGE	V2OE2	New York City	0	0	0	0	0	0	0	0	51	85	33	43	212
DENALI	WSVR	Long Beach	16	13	16	13	18	20	0	0	0	0	0	0	96
DIAMOND PRINCESS	ZCDF8	Anchorage	0	0	0	0	0	0	0	0	0	48	67	68	183
DIANE H.	WUR7250	Kodiak	0	0	0	3	0	0	0	0	0	83	62	0	148
DIRCH MAERSK	OXQP2	Long Beach	6	53	0	63	0	62	0	47	0	24	14	25	294
DIRECT CONDOR	A8AL3	Anchorage	0	0	0	0	0	0	0	0	0	0	16	37	53
DIRECT JABIRU	A8CF4	Anchorage	0	0	0	0	0	0	0	0	0	0	10	48	58
DIRECT KEA	ELVZ7	Anchorage	0	0	0	0	0	0	0	0	0	0	32	60	92
DIRECT TUI	ELVZ5	Norfolk	85	68	77	37	66	34	65	64	57	66	12	0	631
DISCOVERER DEEP SEAS	HP9685	New Orleans	53	42	35	46	47	51	41	65	53	50	45	45	573
DISCOVERER ENTERPRISE	3FZQ7	New Orleans	9	15	20	23	17	23	24	16	0	2	12	14	175
DISCOVERER SPIRIT	3FTU9	Houston	0	0	0	0	0	4	17	23	6	12	14	19	95
DISNEY MAGIC	C6PT7	Jacksonville	0	0	14	18	0	0	0	1	0	0	0	0	33
DOUBLE EAGLE	WYE6617	Kodiak	0	0	0	0	0	0	0	0	0	0	21	0	21
DREW FOSS	WYL7518	Kodiak	0	0	6	22	0	0	6	3	0	13	1	13	64
DUNCAN ISLAND	C6JS	Miami	55	44	25	27	32	21	26	41	44	59	42	60	476
EASTERN DIAMOND	HODT	Seattle	0	0	1	3	2	0	5	6	5	5	6	3	36
EASTERN EXPRESS	3FDN7	Houston	22	9	0	35	70	30	46	22	0	27	1	0	262
ECSTASY	H3GR	Miami	0	0	0	0	0	0	0	0	0	0	8	20	28
EDGAR B. SPEER	WQZ9670	Chicago	69	0	0	0	41	88	66	10	0	1	0	0	275
EDYTH L	C6YC	Baltimore	46	40	49	63	57	50	62	64	28	38	33	30	560
EL MORRO	KCGH	Jacksonville	0	0	23	4	19	4	18	32	33	16	21	27	197
EL YUNQUE	WGJT	Jacksonville	3	48	67	42	36	45	71	69	30	38	46	59	554
ELATION	3FOC5	Miami	0	0	2	24	42	35	17	10	17	64	22	36	269
EMMA FOSS	WCF3931	Kodiak	0	0	0	0	0	0	3	4	22	0	0	0	29
EMPIRE STATE	KKFW	New York City	0	0	0	0	24	27	22	0	0	0	0	0	73
ENDEAVOR	WAUW	New York City	40	54	38	29	41	31	26	27	47	0	41	17	391
ENDURANCE	WAUU	New York City	5	46	56	18	14	35	59	23	17	22	7	23	325
ENDURANCE	WDA3359	Valdez	0	0	0	0	0	0	0	31	43	0	0	0	74
ENTERPRISE	WAUY	New York City	64	35	25	96	62	57	35	35	50	64	30	46	599
EOS I	P3BA7	Seattle	0	0	0	0	0	0	8	65	38	44	74	39	268
EURO SPIRIT	ELUW8	New York City	0	0	0	9	12	15	14	5	0	0	4	0	59
EVER DECENT	3FUO7	New York City	0	0	0	0	12	2	0	15	0	0	0	8	37
EVER DIADEM	3FOF8	New York City	1	0	0	0	0	0	0	14	12	9	14	7	57
EVER GRADE	3FOW2	Seattle	18	13	15	17	15	11	12	14	11	12	13	15	166
EVER REACH	3FQO4	New York City	0	10	10	21	13	19	14	14	11	25	12	20	169
EVER RIGHT	3FML3	Long Beach	0	0	0	0	0	0	3	4	6	5	0	0	18
EVER ROUND	3FQN3	Long Beach	0	0	0	0	0	0	11	6	3	11	3	7	41
EVER ROYAL	3FGI3	Long Beach	0	6	0	15	0	0	0	0	0	0	0	0	21
EVER ULTRA	3FEJ6	Seattle	7	3	0	0	0	0	0	0	0	0	0	0	10
EVER UNIFIC	3FGB9	Anchorage	0	0	0	0	0	0	0	0	0	0	0	4	4

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
EVER UNION	3FFG7	Seattle	0	0	0	8	2	0	0	0	0	7	0	0	17
EVER URANUS	3FCA9	Seattle	0	4	0	0	0	2	0	1	0	0	0	0	7
EVER USEFUL	3FCC9	Anchorage	0	0	0	0	0	0	0	0	0	0	0	4	4
EWA	WEZM	Long Beach	61	56	35	51	29	23	32	54	35	38	29	18	461
EXPLORER OF THE SEAS	ELWX5	Miami	66	363	472	429	458	404	418	141	284	0	345	343	3723
FASCINATION	C6FM9	Miami	0	12	4	0	0	0	5	0	0	0	0	1	22
FISHHAWK	WRB5085	Kodiak	0	0	0	0	21	8	5	0	18	0	0	0	52
FRANCES L	C6YE	Baltimore	36	34	36	47	37	25	30	33	34	36	31	66	445
FRANK A. SHRONTZ	C6PZ3	Oakland	9	31	4	12	8	70	0	45	26	16	37	7	265
FREDERICK BOUCHARD	WYT9297	Kodiak	0	0	0	0	0	0	0	0	0	0	0	16	16
G.L. OSTRANDER	WCV7620	Chicago	10	0	0	11	4	0	0	0	0	0	0	1	26
GALAXY	C6FU6	Miami	3	3	6	11	8	0	0	0	0	0	7	8	46
GALE WIND	WAZ9548	Anchorage	1	2	7	4	12	9	12	12	14	10	0	7	90
GENE DUNLAP	WAS2433	Kodiak	0	0	0	0	0	0	0	0	0	0	2	0	2
GENOA BRIDGE	HOMF	Anchorage	0	0	0	0	0	0	0	0	0	0	0	47	47
GEYSIR	WCZ5528	Norfolk	60	115	42	10	30	40	69	52	33	35	78	65	629
GLADIATOR	WBN5982	Anchorage	0	0	0	0	13	8	0	0	0	0	0	1	22
GLADIATOR	WCZ9000	Kodiak	0	0	0	0	0	3	12	0	0	0	0	0	15
GLOBAL SENTINEL	WRZU	Baltimore	0	0	0	0	0	2	9	0	0	24	7	0	42
GLOIRE	3FPA6	Seattle	6	64	56	22	62	14	69	44	66	43	5	58	509
GOLDEN BEAR	NMRY	Oakland	0	0	0	0	78	58	53	58	0	0	0	0	247
GOLDEN NOVA	3FDV6	Seattle	12	18	3	26	22	23	5	0	0	0	0	0	109
GOLDEN PRINCESS	ZCDA9	Anchorage	0	0	0	0	0	0	0	0	0	0	0	9	9
GRAND PRINCESS	ZCBU5	Anchorage	0	0	0	0	0	0	0	0	0	2	0	9	11
GREAT LAND	WFDP	Seattle	65	2	0	1	8	0	0	22	30	30	15	24	197
GREAT PACIFIC	WBD7567	Kodiak	0	0	0	0	0	0	0	0	0	0	2	0	2
GREEN DALE	WCZ5238	Jacksonville	16	12	12	9	2	12	9	14	24	11	19	19	159
GREEN LAKE	WDDI	Baltimore	11	77	66	75	0	0	0	5	58	31	40	71	434
GREEN POINT	WCY4148	New York City	34	27	29	30	37	7	32	29	12	12	16	17	282
GRETA	WCY2853	Kodiak	0	0	0	0	24	6	0	0	0	78	2	0	110
GUARDIAN	WBO2511	Anchorage	0	0	0	0	1	0	0	0	10	0	0	0	11
GUARDSMAN	WBN5978	Anchorage	67	73	72	34	24	44	23	13	0	1	0	0	351
GULF TITAN	WDA5598	Anchorage	7	8	9	8	11	5	2	5	10	20	15	7	107
GUS W. DARNELL	KCDK	Houston	24	20	10	16	20	27	23	2	0	0	0	0	142
GYR FALCON	WCU6587	Kodiak	0	0	1	2	0	0	0	1	1	0	0	0	5
HALLE FOSS	WCF3930	Kodiak	0	0	0	0	0	0	3	0	0	0	0	0	3
HANJIN BASEL	DHPU	Anchorage	0	0	0	0	0	0	0	0	0	0	0	63	63
HANJIN PHOENIX	A8CN9	Anchorage	0	0	0	0	0	0	0	0	0	0	0	23	23
HANJIN PRETORIA	A8CP6	Anchorage	0	0	0	0	0	0	0	0	0	0	0	49	49
HANJIN SHANGHAI	3FGI5	New York City	0	0	0	0	0	0	5	36	26	19	14	11	111
HANSA CENTURY	ELUP5	New York City	0	0	0	0	0	0	0	0	0	20	35	32	87
HANSA INDIA	ELYD5	Long Beach	68	42	56	36	21	32	17	25	16	1	0	0	314
HARMONY ACE	H3QA	Jacksonville	60	54	54	66	51	8	46	16	29	119	71	42	616
HATSU EAGLE	ZNZH6	Seattle	0	0	0	1	0	0	0	0	1	0	0	0	2
HATSU ELITE	VSJG7	Seattle	11	11	4	9	13	12	14	15	24	19	16	21	169
HATSU ENVOY	VSQL9	Seattle	51	59	23	61	68	11	0	0	0	0	30	29	332
HATSU ETHIC	VQFS4	Seattle	41	58	50	60	75	105	102	66	37	23	22	39	678
HATSU EXCEL	VSXV3	Seattle	14	20	12	13	13	14	12	5	12	7	6	0	128
HENRY SAUSE	WTW9259	Kodiak	1	0	0	0	0	0	0	0	0	0	0	0	1

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HMI BRENTON REEF	WCY8453	Kodiak	63	37	53	36	49	0	0	0	0	25	52	43	358
HOLIDAY	C6FM6	New Orleans	0	0	0	0	18	12	15	17	16	6	3	0	87
HOOD ISLAND	C6LU4	Miami	44	46	19	27	54	58	47	43	37	32	11	25	443
HORIZON ENTERPRISE	KRGB	Oakland	574	585	551	689	706	606	684	626	542	580	545	600	7288
HORIZON ANCHORAGE	KGTX	Anchorage	90	43	81	94	66	54	103	91	94	387	123	71	1297
HORIZON CHALLENGER	WZJC	Jacksonville	0	39	78	64	67	128	117	76	84	79	73	74	879
HORIZON CONSUMER	WCHF	Long Beach	21	39	52	31	29	40	40	22	20	29	4	3	330
HORIZON CRUSADER	WZJF	Jacksonville	0	51	2	47	50	55	11	64	59	86	44	66	535
HORIZON DISCOVERY	WZJD	Jacksonville	0	41	55	55	60	48	48	40	30	34	56	62	529
HORIZON EXPEDITION	WPGJ	Seattle	0	0	0	55	19	0	0	0	7	25	58	6	170
HORIZON HAWAII	KIRF	New York City	72	47	72	75	67	50	70	67	82	79	62	71	814
HORIZON KODIAK	KGTZ	Anchorage	45	50	82	94	86	74	86	39	62	67	79	72	836
HORIZON NAVIGATOR	WPGK	Long Beach	29	61	61	43	48	35	39	46	39	22	31	27	481
HORIZON PACIFIC	WSRL	Long Beach	69	60	55	72	58	52	77	80	77	64	58	84	806
HORIZON PRODUCER	WJBJ	New York City	17	84	75	70	71	61	62	68	66	55	51	66	746
HORIZON RELIANCE	WFLH	Long Beach	78	69	71	79	80	62	81	85	94	80	65	76	920
HORIZON SPIRIT	WFLG	Oakland	66	53	54	11	37	53	68	62	67	84	58	53	666
HORIZON TACOMA	KGTY	Anchorage	52	68	54	44	51	31	40	65	53	52	44	33	587
HORIZON TRADER	KIRH	Oakland	57	62	48	48	40	33	53	63	60	57	46	63	630
HUMBER ARM	ZCBQ2	Houston	0	4	10	43	20	0	0	0	0	0	0	0	77
HYUNDAI GRACE	9VVD	New York City	0	0	23	14	0	2	5	1	6	0	0	0	51
IBIS ARROW	C6CU6	Seattle	21	30	0	0	0	0	0	0	26	31	0	0	108
INDEPENDENCE	WRYG	Baltimore	33	45	0	25	50	60	41	49	32	26	20	0	381
INDEPENDENT VENTURE	A8CG2	Baltimore	0	0	0	0	0	0	1	40	35	31	28	34	169
INDIAN OCEAN	C6T2063	New York City	28	27	16	48	55	16	14	33	25	1	48	73	384
INDIANA HARBOR	WXN3191	Chicago	40	0	0	74	1	66	0	0	1	0	0	0	182
INDOTRANS CELEBES	VRZN9	Norfolk	0	0	0	0	0	0	0	0	0	0	0	3	3
INDUSTRIAL CHALLENGER	WDHL	Norfolk	3	0	0	0	0	1	14	0	6	0	0	0	24
INLAND SEAS	WCJ6214	Chicago	0	0	0	0	1	0	0	0	0	0	0	0	1
INLET RESEARCH	KEC43	Anchorage	0	0	0	0	0	0	0	0	8	4	2	1	15
INSPIRATION	C6FM5	Anchorage	0	0	0	0	0	0	0	0	0	0	2	1	3
ISLA DE CEDROS	VRXU2	Seattle	87	71	77	78	20	55	100	17	0	0	0	0	505
ISLAND CHAMPION	WCZ7046	Anchorage	0	0	0	0	0	0	0	6	11	0	0	0	17
ISLAND PRINCESS	ZCDG4	Anchorage	0	0	0	0	0	0	0	0	9	55	48	61	173
ISLAND WARRIOR	WDA9217	Anchorage	0	0	0	0	0	0	0	13	0	0	0	0	13
ITB BALTIMORE	WXKM	Baltimore	8	14	30	5	21	9	1	1	4	13	12	0	118
ITB GROTON	KMJL	New York City	39	38	27	20	12	71	57	23	30	52	71	34	474
ITB JACKSONVILLE	WNDG	Baltimore	0	0	0	0	2	0	0	0	0	4	13	18	37
ITB NEW YORK	WVDG	Baltimore	10	6	8	0	0	23	15	0	0	3	13	9	87
IVER FOSS	WYE6442	Kodiak	0	0	0	1	0	6	0	0	0	13	4	0	24
IWANUMA MARU	3ESU8	Seattle	0	0	0	0	93	0	0	0	0	0	0	0	93
JAG PRACHI	ATPN	New Orleans	0	0	0	0	0	0	0	25	43	0	0	0	68
JAG PRAKASH	AUBK	Anchorage	87	85	121	102	90	75	63	97	87	40	69	79	995
JAMES R. BARKER	WYP8657	Chicago	0	0	19	190	77	84	158	100	79	90	70	87	954
JEFFREY FOSS	WCX4608	Kodiak	0	0	0	0	0	10	0	0	0	26	11	0	47
JENS MAERSK	OYYK2	New York City	38	37	42	44	34	37	44	32	52	6	0	57	423
JEPPESEN MAERSK	OWTW2	New York City	0	0	0	0	10	26	23	10	41	26	0	9	145
JERVIS BAY	MQPF2	Anchorage	0	0	0	0	0	0	0	0	0	0	2	38	40
JOHANNES MAERSK	OWFD2	Miami	37	44	48	19	14	20	18	21	22	12	12	7	274
JOHN BRIX	WCY7560	Kodiak	7	19	12	0	0	0	11	11	51	24	0	0	135

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JOHN G. MUNSON	WE3806	Chicago	12	0	1	2	0	25	21	3	0	1	0	1	66
JOIDES RESOLUTION	D5BC	Norfolk	27	0	0	0	0	2	0	1	0	108	60	29	227
JOSEPH L. BLOCK	WDA2768	Chicago	0	0	0	13	3	7	5	1	1	0	0	14	44
JOSEPH SAUSE	WTW9258	Kodiak	1	0	0	0	0	0	0	0	0	0	0	0	1
JUDY LITRICO	KCKB	New Orleans	2	26	46	45	38	4	0	42	22	36	36	35	332
JUSTINE FOSS	WYL4978	Kodiak	8	6	1	0	5	8	0	5	15	12	13	10	83
KAPITAN AFANASYEV	UFIL	Seattle	0	0	0	7	61	38	22	18	21	7	19	0	193
KAREN ANDRIE	WBS5272	Chicago	0	0	0	3	0	0	0	0	0	0	0	2	5
KATHERINE	WUS5485	Kodiak	0	0	0	0	0	0	0	0	6	0	0	0	6
KAUAI	WSRH	Long Beach	63	62	37	31	48	47	26	33	53	43	27	42	512
KAYE E. BARKER	WCF3012	Chicago	4	0	0	42	22	4	6	38	19	0	11	28	174
KEISHO	3FYN4	Seattle	0	0	0	0	0	0	0	0	6	0	0	8	14
KENAI	WSNB	Kodiak	49	105	20	4	5	11	7	17	18	3	0	13	252
KENNICOTT	WCY2920	Kodiak	0	0	47	32	69	52	75	55	83	14	0	0	427
KILO MOANA	WDA7827	Honolulu	0	8	45	67	64	52	38	76	54	53	81	67	605
KIYI	KAO107	Chicago	0	0	0	0	0	6	3	24	0	6	3	0	42
KOTA PERTAMA	DGVS	New York City	0	0	0	0	18	15	33	49	32	31	33	39	250
KOTZEBUE RESEARCH	KUU619	Anchorage	0	0	0	0	0	0	0	25	20	18	1	0	64
KURE	3FGN3	Seattle	22	0	0	0	0	0	0	0	13	1	0	0	36
LAKE ARU	DYZM	Seattle	0	0	0	0	0	0	0	20	0	0	0	0	20
LAUREN FOSS	WDB3834	Kodiak	0	0	0	0	0	0	43	58	37	0	0	0	138
LAZY BAY	WDB8266	Kodiak	0	0	0	0	0	0	0	0	0	7	0	1	8
LECONTE	WZE4270	Kodiak	0	0	0	0	0	0	0	0	0	0	0	4	4
LEE A. TREGURTHA	WUR8857	Chicago	0	0	0	0	0	0	0	0	20	27	9	15	71
LEGEND OF THE SEAS	C6SL5	New Orleans	0	0	0	0	0	0	0	0	0	0	0	33	33
LEYLA KALKAVAN	TCCJ7	Norfolk	15	21	12	0	0	0	0	27	24	7	0	0	106
LIBERTY	WRYX	Baltimore	28	41	24	55	50	55	55	51	56	64	56	48	583
LIBERTY EAGLE	WHIA	Houston	0	0	0	21	13	0	0	0	5	23	12	10	84
LIBERTY GLORY	WADP	New Orleans	0	0	20	8	0	0	0	45	40	21	0	10	144
LIBERTY GRACE	WADN	New Orleans	0	0	16	0	0	0	0	0	29	29	47	0	121
LIBERTY SEA	KPZH	New Orleans	0	0	0	0	0	0	1	50	55	30	9	25	170
LIBERTY SPIRIT	WCPU	New Orleans	31	16	25	38	44	46	24	21	24	7	7	1	284
LIBERTY STAR	WCBP	New Orleans	0	0	1	111	40	15	64	59	25	10	36	90	451
LIBERTY SUN	WCOB	New Orleans	56	23	0	33	11	0	17	0	21	24	10	29	224
LIBERTY WAVE	KRHZ	Houston	0	10	2	7	9	6	7	2	0	24	23	5	95
LIHUE	WTST	Oakland	50	39	0	11	1	0	27	18	49	53	34	37	319
LINDA OLDENDORFF	ELRR2	Baltimore	0	0	0	0	0	0	0	0	0	0	0	32	32
LINDEN PRIDE	H3VP	Houston	0	0	0	0	0	0	0	0	0	61	76	49	186
LIONS GATE BRIDGE	H9LV	Anchorage	0	0	0	0	0	0	0	0	0	0	0	26	26
LNG ARIES	V7BW7	New York City	0	0	0	0	0	0	0	0	19	6	0	37	62
LNG CAPRICORN	V7BW8	New York City	0	0	0	0	0	0	0	75	49	62	66	55	307
LNG GEMINI	V7BW9	Kodiak	31	29	27	19	25	15	25	40	43	24	40	33	351
LNG LEO	V7BX2	New York City	0	9	64	73	26	13	52	73	86	61	67	61	585
LNG LIBRA	V7BX3	New York City	0	0	0	0	0	0	0	1	1	0	0	0	2
LNG TAURUS	V7BX4	New York City	0	15	67	62	62	58	62	14	15	10	37	61	463
LNG VIRGO	V7BX5	New York City	0	0	0	0	60	77	75	66	0	47	35	28	388
LOIS H.	WTD4576	Kodiak	0	0	0	0	2	1	0	0	0	0	5	4	12
LT UNITY	3FCD9	Seattle	3	0	2	2	0	0	0	0	0	5	9	0	21
LTC CALVIN P. TITUS	KJLV	Jacksonville	35	9	0	0	0	0	0	0	0	0	0	0	44
LURLINE	WLVD	Oakland	10	10	22	15	7	0	2	7	33	28	41	47	222

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LYKES DISCOVERER	WGXO	Houston	138	80	104	76	61	53	75	89	140	111	81	87	1095
LYKES EAGLE	VSUA7	Anchorage	12	5	51	28	24	13	7	6	28	33	42	35	284
LYKES EXPLORER	WGLA	Houston	50	98	108	41	45	86	65	45	46	42	49	56	731
LYKES HERO	ZCBN5	Anchorage	0	0	0	0	0	0	0	0	0	0	7	42	49
LYKES LIBERATOR	WGXN	Houston	77	53	77	111	66	105	109	82	130	161	60	89	1120
LYKES MOTIVATOR	WABU	Houston	32	46	41	30	27	27	86	44	39	81	79	43	575
LYKES NAVIGATOR	WGMJ	Houston	103	170	209	71	49	0	65	68	87	83	84	92	1081
LYKES RANGER	ZIYE7	Houston	0	26	31	35	30	30	41	56	26	44	19	14	352
M/V ASPHALT COMMANDER	WFJN	New Orleans	0	0	0	0	0	0	29	11	0	0	0	7	47
M/V FREEDOM	WDB5483	Baltimore	34	37	38	39	38	37	42	50	43	50	36	50	494
M/V GSF EXPLORER	WCX5333	New Orleans	0	0	0	0	0	0	21	87	77	60	60	58	363
M/V PATRIOT	WQVY	Baltimore	9	12	50	16	36	39	34	35	36	60	33	27	387
M/V RESOLVE	WCZ5535	Baltimore	39	20	4	0	0	0	8	18	23	16	14	15	157
MAASDAM	PFRO	Miami	4	58	69	52	4	9	3	0	0	5	53	64	321
MABEL RICKMERS	V7EO5	New York City	0	0	0	0	0	0	0	0	18	0	0	0	18
MACKINAC BRIDGE	JKES	New York City	55	47	44	44	53	52	42	50	47	52	52	50	588
MADISON MAERSK	OVJB2	Oakland	44	38	38	14	32	19	53	8	13	8	33	13	313
MAERSK ALASKA	KAKF	Baltimore	20	31	0	0	0	0	0	0	0	0	0	0	51
MAERSK ARIZONA	KAKG	Baltimore	0	0	0	0	0	0	0	0	0	40	37	17	94
MAERSK CAROLINA	WBDS	Charleston	9	0	23	30	36	56	11	40	19	3	29	42	298
MAERSK CONSTELLATION	WRYJ	Houston	7	0	59	4	25	0	0	0	0	1	0	1	97
MAERSK DAMMAM	V2OE3	Oakland	49	14	0	0	28	27	26	20	0	0	0	0	164
MAERSK DUBLIN	V2OE1	New York City	0	0	0	0	0	0	0	11	19	5	16	3	54
MAERSK GEORGIA	WAHP	New York City	0	0	0	0	12	17	13	18	17	19	0	0	96
MAERSK MALACCA	9VIN7	Charleston	0	0	0	0	0	8	0	0	0	0	0	0	8
MAERSK MISSOURI	WAHV	Norfolk	48	39	40	18	2	20	20	0	25	10	23	19	264
MAERSK NANTES	V2OO7	New York City	0	0	0	0	0	9	20	47	37	52	44	53	262
MAERSK NEWARK	A8CF2	New York City	0	1	43	25	35	22	23	45	37	36	37	29	333
MAERSK SUN	S6ES	Seattle	0	0	41	0	0	0	0	69	5	0	0	71	186
MAERSK TAIKI	9VIG	Baltimore	48	30	36	23	42	11	8	36	44	24	43	24	369
MAERSK TAIYO	9VJO	Jacksonville	0	0	0	0	0	34	7	0	0	8	68	45	162
MAERSK VALENCIA	DAPG	New York City	0	0	0	0	0	0	0	0	0	5	36	74	115
MAERSK VIRGINIA	WAHK	Norfolk	0	0	0	0	2	0	0	6	0	9	0	0	17
MAERSK WIND	S6TY	Baltimore	4	0	0	0	0	0	0	25	83	50	42	28	232
MAGLEBY MAERSK	OUSH2	New York City	14	41	10	51	25	24	27	51	34	48	36	34	395
MAHARASHTRA	VTSQ	Seattle	0	0	17	18	3	12	10	5	13	13	6	0	97
MAHIMAHI	WHRN	Oakland	47	40	51	60	55	29	41	46	40	42	32	29	512
MAIA H.	WYX2079	Kodiak	0	0	0	0	0	0	0	0	2	1	20	10	33
MAJESTIC MAERSK	OUJH2	New York City	40	26	42	32	43	27	30	8	10	13	20	19	310
MALOLO	WYH6327	Kodiak	6	8	0	0	0	0	0	0	0	0	0	0	14
MANFRED NYSTROM	WCN3590	Kodiak	0	20	12	19	10	4	7	0	0	0	0	0	72
MANOA	KDBG	Oakland	45	56	42	39	56	58	53	32	43	42	48	1	515
MANUKAI	WRGD	New York City	47	30	41	43	34	28	33	22	13	12	17	39	359
MARCY J	WCF4791	Kodiak	0	0	0	0	0	0	0	0	0	19	0	0	19
MAREN MAERSK	OWZU2	Long Beach	38	13	31	11	44	4	60	15	45	7	52	24	344
MARGRETHE MAERSK	OYSN2	Long Beach	31	9	13	6	14	34	23	31	19	43	32	35	290
MARIE MAERSK	OULL2	New York City	0	39	6	29	20	32	34	25	34	26	32	0	277
MARIELLE BOLTEN	ELZH9	New York City	0	0	0	0	41	37	34	32	36	13	2	5	200
MARINE COLUMBIA	KLKZ	Oakland	62	50	65	65	56	49	54	9	20	63	0	0	493

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
MARINER OF THE SEAS	C6FV9	Jacksonville	0	0	0	0	0	0	0	0	18	1	0	0	19
MARIT MAERSK	OZFC2	Miami	0	0	3	0	0	0	0	0	0	0	0	0	3
MARK HANNAH	WYZ5243	Chicago	0	0	0	13	22	20	3	15	0	13	14	2	102
MARTORELL	HPNE	New York City	0	0	0	0	40	52	47	92	62	88	53	50	484
MATANUSKA	WN4201	Kodiak	0	0	0	0	0	0	0	0	0	0	4	17	21
MATHILDE MAERSK	OUUU2	Long Beach	16	32	22	29	25	35	29	39	29	51	24	46	377
MATSONIA	KHRC	Oakland	16	41	43	21	7	15	41	44	22	27	21	44	342
MAUI	WSLH	Long Beach	53	62	43	51	34	40	55	43	51	44	38	55	569
MAUNA LOA	WCY8398	Kodiak	3	0	0	0	0	0	0	0	0	0	0	0	3
MAUNAWILI	WDB7104	New York City	0	0	0	0	0	0	0	4	18	13	28	46	109
MAURICE EWING	WLDZ	New York City	0	11	0	17	71	29	30	19	2	34	47	48	308
MAYVIEW MAERSK	OWEB2	Oakland	25	29	31	26	9	26	45	21	17	36	53	31	349
MC-KINNEY MAERSK	OUZW2	New York City	34	7	7	10	15	12	5	9	16	11	17	29	172
MCKEE SONS	WCZ9703	Chicago	0	0	6	64	26	33	22	25	33	61	63	63	396
MECTA SEA	C6PJ3	New Orleans	0	0	0	0	0	0	0	0	5	11	0	0	16
MEKONG PIONEER	V2JN	Miami	79	6	19	57	16	0	0	0	0	44	30	30	281
MELVILLE	WECB	Long Beach	46	51	48	28	26	39	81	62	75	85	25	0	566
MESABI MINER	WYQ4356	Chicago	0	0	0	30	36	17	11	7	37	45	52	88	323
METTE MAERSK	OXKT2	Long Beach	23	25	21	37	21	25	22	49	16	34	12	8	293
MI-OI	WTT3606	Kodiak	0	0	0	0	0	0	0	0	0	1	0	0	1
MICHIGAN	WRB4141	Chicago	0	0	0	4	4	0	0	0	0	4	0	0	12
MIDNIGHT SUN	WAHG	Seattle	48	57	30	52	43	36	48	49	140	135	54	61	753
MIKI HANA	WTW9252	Kodiak	5	0	0	0	0	6	0	0	0	0	0	0	11
MIKI MIKI	WTW9266	Kodiak	0	1	4	0	0	0	0	0	0	0	0	0	5
MOKIHANA	WNRD	Oakland	50	43	46	60	64	61	56	58	43	57	34	67	639
MOKU PAHU	WBWK	Oakland	1	31	38	46	41	16	52	34	27	41	0	39	366
MOL CALLAO	MXMM5	Anchorage	0	0	0	0	0	0	0	0	0	0	15	64	79
MOL COMMITMENT	9VID2	Charleston	0	0	0	0	0	1	12	6	0	0	24	29	72
MOL EFFICIENCY	HOZY	Anchorage	0	0	0	0	0	0	0	0	0	0	0	27	27
MOL EXCELLENCE	HPEF	Anchorage	0	0	0	0	0	0	0	0	0	0	0	30	30
MOL INITIATIVE	3ELL6	Norfolk	0	0	0	5	0	0	0	0	0	0	0	0	5
MOL INNOVATION	9VVP	Oakland	24	16	16	49	29	38	25	35	22	20	19	19	312
MOL OASIS	3ENO4	Anchorage	0	0	0	0	0	0	0	0	0	0	0	7	7
MOL VIGOR	9VVN	Oakland	0	1	13	7	13	4	35	62	18	52	35	58	298
MOL WELLINGTON	H9TO	Anchorage	0	0	0	0	0	0	0	0	0	0	0	34	34
MSC FEDERICA	C4LV	New York City	0	0	0	0	7	6	31	18	4	3	22	16	107
MSC INSA	3FWO5	New York City	0	0	0	0	0	22	4	10	2	7	4	0	49
MSC JESSICA	H3YF	New York City	0	0	0	0	2	27	17	19	20	4	4	15	108
MSC MATILDE	HODP	New York City	0	0	0	0	0	0	0	0	0	52	56	53	161
MSC NURIA	3FIE6	New York City	0	0	0	0	0	0	8	10	7	0	0	0	25
MSC SPAIN	DNKL	Norfolk	0	0	0	0	0	2	28	29	28	16	17	21	141
MT VIRGO VOYAGER	C6FG8	New Orleans	7	4	11	21	13	0	0	39	24	23	67	29	238
MV MONTAUK	WDCJ	New Orleans	12	26	51	47	28	0	1	0	16	12	26	20	239
NANUQ	WCY8498	Valdez	0	0	0	0	0	0	0	0	0	0	0	4	4
NATHANIEL B. PALMER	WBP3210	Seattle	71	33	0	0	0	0	0	35	0	1	0	0	140
NATOMA	WBB5799	Kodiak	6	0	0	0	0	0	0	0	5	4	3	0	18
NAVAJO	WCT5737	Kodiak	2	15	3	4	7	6	7	3	0	0	4	6	57
NAVIGATOR	WBO3345	Anchorage	0	0	0	0	48	70	15	35	40	3	5	7	223
NAVIGATOR OF THE SEAS	C6FU4	Miami	38	32	23	13	11	2	2	0	16	10	4	6	157
NEW HORIZON	WKWB	Long Beach	0	14	12	4	2	11	45	47	11	13	2	11	172

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NOAA DAVID STARR JORDAN	WTDK	Long Beach	5	0	0	0	41	46	43	6	100	166	70	0	477
NOAA SHIP ALBATROSS IV	WMVF	Norfolk	4	69	67	70	73	14	90	68	87	140	96	0	778
NOAA SHIP DELAWARE II	KNBD	New York City	28	93	68	156	92	45	127	147	73	88	41	0	958
NOAA SHIP FAIRWEATHER	WTEB	Anchorage	0	0	0	0	0	0	1	0	0	0	0	0	1
NOAA SHIP GORDON GUNTER	WTEO	New Orleans	63	70	43	117	151	115	189	101	142	102	86	0	1179
NOAA SHIP HI' IALAKAI	WTEY	Seattle	0	0	0	0	0	0	0	5	33	72	2	0	112
NOAA SHIP KA'IMIMOANA	WTEU	Honolulu	12	0	35	19	93	33	95	57	99	24	89	55	611
NOAA SHIP MCARTHUR II	WTEJ	Seattle	0	23	123	160	136	27	227	195	203	159	0	0	1253
NOAA SHIP MILLER FREEMAN	WTDM	Seattle	0	0	46	85	106	138	172	96	145	59	20	0	867
NOAA SHIP NANCY FOSTER	WTER	Norfolk	0	35	12	60	53	26	55	56	69	35	0	0	401
NOAA SHIP OREGON II	WTDO	New Orleans	0	0	0	0	95	52	102	72	67	49	51	0	488
NOAA SHIP OSCAR ELTON SETTE	WTEE	Jacksonville	53	5	41	40	39	48	43	62	18	22	6	0	377
NOAA SHIP RAINIER	WTEF	Seattle	0	0	0	0	0	8	28	12	0	1	0	1	50
NOAA SHIP RONALD H BROWN	WTEC	New Orleans	0	22	65	39	108	76	78	66	30	57	65	66	672
NOAA SHIP THOMAS JEFFERSON	WTEA	Norfolk	0	0	1	32	26	34	1	0	0	0	0	0	94
NOBEL STAR	KRPP	Houston	68	78	55	25	21	15	0	0	0	0	0	0	262
NORCOASTER	WYP7276	Kodiak	0	0	0	0	4	0	1	1	0	0	6	0	12
NORDFALCON	P3KC8	New York City	0	0	0	0	0	0	0	3	50	55	5	0	113
NORDMAX	P3YS5	Seattle	36	0	0	0	0	0	0	0	0	0	0	0	36
NORMA H.	WYL6686	Kodiak	0	0	0	0	16	0	0	0	0	0	0	0	16
NORTH STAR	KIYI	Seattle	48	29	54	57	73	96	130	65	55	121	123	88	939
NORTHERN SPIRIT	WAQ2746	Kodiak	27	75	0	0	0	0	0	0	0	0	0	0	102
NORTHERN VICTOR	WCZ6534	Kodiak	12	0	0	4	0	4	0	0	0	11	0	0	31
NORWEGIAN SEA	C6DM2	Houston	0	54	88	67	99	74	67	65	67	52	49	39	721
NOVA TERRA	C6IZ7	Miami	0	0	9	12	25	44	57	48	38	44	38	43	358
NUEVO LEON	VQHV6	Houston	9	0	0	0	0	0	0	0	0	0	0	0	9
OCEAN CONFIDENCE	V7EA2	Houston	0	0	0	0	0	0	0	13	7	0	0	0	20
OCEAN MARINER	WCF3990	Anchorage	1	0	0	0	0	0	27	5	0	1	0	1	35
OCEAN NAVIGATOR	WSC2552	Anchorage	0	0	0	0	0	0	0	0	0	0	1	0	1
OCEAN PREFACE	VRUL7	New Orleans	0	0	0	0	0	0	0	0	0	0	0	1	1
OCEAN RANGER	WAM7635	Anchorage	0	4	5	1	4	0	0	0	20	23	4	12	73
OCEAN RELIANCE	WADY	Kodiak	1	4	8	15	8	29	3	1	6	8	6	8	97
OCEAN SARATOGA	V7EB3	Houston	0	0	0	0	0	0	0	7	0	0	0	0	7
OCEAN SERVICE	WTW9263	Kodiak	6	1	0	0	4	0	0	0	0	0	0	0	11
OCEAN STAR	V7EB6	Houston	0	0	0	0	0	0	0	7	0	0	0	0	7
OCEAN VALIANT	V7EB7	Houston	0	0	0	0	0	0	0	1	2	0	0	0	3
OCEAN VICTORY	V7EB8	Kodiak	0	0	0	0	0	59	100	69	27	12	0	0	267
OGLEBAY NORTON	WAQ3521	Chicago	0	0	0	0	0	0	0	0	0	1	0	0	1
OLEANDER	PJJU	New York City	0	1	10	15	3	0	8	0	1	8	31	6	83
OLGA MAERSK	OXBB2	New York City	0	0	0	0	0	0	0	0	0	0	0	1	1
OLIVIA MAERSK	OXKO2	Miami	32	15	17	61	32	23	9	33	83	9	14	42	370
OLUF MAERSK	OXFU2	New York City	33	6	30	12	14	20	13	17	36	11	39	21	252
OOCL AMERICA	VRWE8	Seattle	0	0	0	0	0	0	0	0	0	14	33	4	51

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
OOCL CALIFORNIA	VRWC8	Seattle	24	28	26	38	14	20	22	33	36	13	50	33	337
OOCL CHICAGO	VRWQ2	Anchorage	0	0	0	0	0	0	0	0	0	0	0	53	53
OOCL CHINA	VRWE7	Anchorage	0	0	0	0	0	0	0	0	0	0	0	28	28
OOCL FAIR	VRWB8	Long Beach	38	27	0	5	0	4	11	9	16	7	24	20	161
OOCL FAITH	VRWG6	New York City	0	0	0	0	0	25	26	52	57	58	74	50	342
OOCL FIDELITY	VRWG5	Long Beach	1	0	2	1	0	3	0	27	18	24	16	23	115
OOCL FORTUNE	VRWF2	Norfolk	0	0	0	13	34	39	45	34	27	42	24	37	295
OOCL HAMBURG	VRZK	Anchorage	0	0	0	0	0	0	0	0	0	0	0	1	1
OOCL HONG KONG	VRVA5	Oakland	29	18	35	40	33	26	33	34	43	31	30	22	374
OOCL JAPAN	VRWB7	Anchorage	0	0	0	0	0	0	0	0	0	0	0	22	22
OOCL KOREA	DMRG	Anchorage	0	0	0	0	0	0	0	0	0	0	0	17	17
OOCL NETHERLANDS	VRVN6	Long Beach	4	0	0	0	0	3	8	0	4	0	0	12	31
OOCL NEW YORK	DPAK	Anchorage	0	0	0	0	0	0	0	0	0	0	15	18	33
OOCL NINGBO	VRZL3	Anchorage	0	0	0	0	0	0	0	0	0	0	0	50	50
OOSTERDAM	PBKH	Anchorage	0	0	0	0	0	0	0	0	0	1	0	0	1
ORIANA	GVSN	Miami	0	0	0	0	0	0	0	0	0	4	18	3	25
ORIENTE CREST	HPFA	Seattle	0	0	5	12	0	0	0	0	0	0	0	0	17
ORIENTE GRACE	3FHT4	Seattle	0	27	39	0	0	0	0	0	0	0	0	0	66
ORIENTE NOBLE	3FVF5	Seattle	0	0	0	0	16	0	0	0	0	0	0	0	16
ORIENTE PRIME	3FOU4	Seattle	0	0	0	0	35	2	0	0	0	0	0	0	37
ORIENTE SHINE	H9AL	Seattle	0	21	10	6	0	0	0	0	7	24	16	23	107
ORIENTE VICTORIA	3FVG8	Seattle	0	24	17	0	0	0	0	61	25	48	34	53	262
ORKUN KALKAVAN	TCCG6	Norfolk	31	23	7	0	0	0	0	0	0	1	0	0	62
OTELLO	SCFH	New York City	0	0	0	0	0	0	0	29	79	35	40	29	212
OURO DO BRASIL	ELPP9	Baltimore	0	0	25	40	29	7	27	1	0	0	0	0	129
OVERSEAS CHICAGO	KBCF	Kodiak	38	27	4	0	0	0	8	4	0	1	9	37	128
OVERSEAS HARRIETTE	WRFJ	Houston	29	45	44	12	16	23	9	37	39	41	0	0	295
OVERSEAS JOYCE	WUQL	Jacksonville	19	20	4	20	14	8	1	13	23	27	18	41	208
OVERSEAS MARILYN	WFQB	Houston	6	0	0	3	2	0	9	9	3	0	0	0	32
OVERSEAS NEW ORLEAN	SWFKW	Houston	27	36	29	31	16	15	2	28	49	31	12	20	296
OVERSEAS NEW YORK	WMCK	Kodiak	48	30	45	0	0	5	9	25	23	28	14	0	227
OVERSEAS PHILADELPHIA	WGDB	Houston	0	0	0	0	17	0	0	0	0	0	0	0	17
OVERSEAS WASHINGTON	WFGV	Valdez	0	0	0	0	0	0	0	0	0	0	0	17	17
P&O NEDLLOYD DAMMAM	A8CA3	Norfolk	4	0	0	0	0	0	0	0	0	0	0	0	4
PACIFIC AVENGER	WCY8175	Kodiak	0	1	2	0	1	0	0	1	0	0	7	23	35
PACIFIC CHALLENGER	WDA3588	Kodiak	81	22	67	153	147	141	230	335	220	283	308	354	2341
PACIFIC EXPLORER	V7DN3	Houston	41	39	38	21	4	1	0	0	0	1	0	0	145
PACIFIC FREEDOM	WDJF	Kodiak	0	2	8	0	0	10	61	12	0	0	17	0	110
PACIFIC PATRIOT	WDB6493	Kodiak	0	0	3	3	14	13	59	77	0	78	39	3	289
PACIFIC PRIDE	WCN4995	Kodiak	0	3	38	34	0	8	0	0	0	0	0	0	83
PACIFIC PRINCESS	ZDDY7	Anchorage	0	0	0	0	0	0	0	0	8	18	8	1	35
PACIFIC RAVEN	WDB7583	Kodiak	0	0	0	0	0	0	0	0	0	0	8	6	14
PANDALUS	WAV7611	Anchorage	0	0	1	0	0	1	0	0	0	0	0	0	2
PARAGON	WDA2311	Kodiak	79	56	43	51	54	58	79	116	42	1	1	25	605
PATHFINDER	WBN8467	Valdez	0	0	0	0	0	0	13	3	0	10	5	0	31
PATRIOT	NL9WX	Kodiak	0	0	0	0	0	0	79	47	17	28	30	26	227
PAUL BUCK	NBBO	Houston	0	0	0	0	0	0	0	0	0	1	0	0	1
PAUL R. TREGURTHA	WYR4481	Chicago	0	0	32	89	84	88	69	94	108	121	83	87	855
PENANG SENATOR	DQVH	Seattle	51	29	67	73	54	45	36	19	42	5	37	54	512
PERSEVERANCE	WSKH	Houston	0	0	0	0	0	0	13	12	15	2	3	5	50

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Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
PHILIP R. CLARKE	WE3592	Chicago	0	0	0	0	0	2	1	0	0	0	0	0	3
PHOENIX VOYAGER	C6QE3	Oakland	28	5	0	0	0	0	0	0	3	67	19	29	151
PHYLLIS DUNLAP	WDA6552	Kodiak	0	0	0	0	0	0	1	30	129	2	0	0	162
PINE ARROW	C6NZ3	New York City	0	0	0	0	0	61	34	20	69	88	35	0	307
PITTSBURG	ELTQ6	Baltimore	74	67	67	61	36	55	65	59	64	78	67	60	753
POINT BARROW	WBM5088	Anchorage	0	0	0	0	22	16	22	14	0	53	29	0	156
POLAR ADVENTURE	WAZV	New Orleans	0	0	0	0	0	0	0	0	0	2	0	20	22
POLAR ALASKA	KSBK	Valdez	27	9	21	9	7	9	5	0	22	56	22	24	211
POLAR CALIFORNIA	WMCV	Long Beach	9	15	60	33	11	3	10	36	27	29	28	20	281
POLAR DISCOVERY	WACW	New Orleans	10	14	10	8	14	17	23	18	11	9	24	26	184
POLAR EAGLE	ELPT3	Anchorage	183	176	174	153	187	88	196	199	192	186	178	133	2045
POLAR ENDEAVOUR	WCAJ	New Orleans	26	18	34	8	0	9	20	7	25	12	18	14	191
POLAR RESOLUTION	WDJK	New Orleans	55	57	51	24	27	58	59	51	40	44	45	48	559
POTOMAC BRIDGE	A8CI9	Anchorage	0	0	0	0	0	0	0	0	0	0	0	30	30
PREMIUM DO BRASIL	A8BL4	Baltimore	26	26	9	7	14	13	7	34	14	8	12	8	178
PRESIDENT ADAMS	WRYW	Seattle	55	115	74	65	51	109	60	116	93	77	59	53	927
PRESIDENT GRANT	WCY2098	Long Beach	56	61	54	39	43	22	23	67	51	45	10	27	498
PRESIDENT JACKSON	WRYC	Seattle	81	56	30	85	52	45	42	28	43	39	47	27	575
PRESIDENT POLK	WRYD	Seattle	61	152	51	42	24	105	88	69	115	39	31	22	799
PRESIDENT TRUMAN	WNDP	Seattle	66	51	29	62	67	31	67	47	50	65	65	62	662
PRESIDENT WILSON	WCY3438	Long Beach	26	44	46	31	44	45	42	47	54	30	39	68	516
PRESQUE ISLE	WZE4928	Chicago	0	0	0	5	21	69	11	8	7	11	25	43	200
PRIDE OF BALTIMORE II	WUW2120	Baltimore	0	0	0	0	5	32	32	17	24	2	0	0	112
PRINCE WILLIAM SOUND	WSDX	Valdez	0	0	0	0	9	8	4	4	4	0	0	0	29
PT BROWER	WDA2796	Anchorage	0	0	0	0	0	0	0	3	26	12	0	0	41
PT. THOMPSON	WBN5092	Anchorage	0	0	0	0	27	0	0	0	0	0	0	0	27
PUSAN SENATOR	DQVG	Seattle	24	33	13	8	14	1	23	27	12	16	20	12	203
R.J. PFEIFFER	WRJP	Long Beach	31	32	17	18	29	26	26	18	15	12	2	6	232
R/V TIGLAX	WZ3423	Anchorage	0	0	0	14	22	14	7	17	0	0	0	3	77
RAINBOW QUEST	VRVZ2	Anchorage	0	0	0	0	0	0	0	1	0	10	10	0	21
REBECCA LYNN	WCW7977	Chicago	1	0	0	0	0	0	0	0	0	0	0	3	4
REDEEMER	WDA8432	Kodiak	0	0	0	0	0	0	0	0	0	0	0	18	18
REDOUBT	WCG3013	Anchorage	0	0	0	11	9	7	8	2	0	1	0	0	38
REGAL PRINCESS	MZCE9	Anchorage	0	0	0	0	0	0	0	0	0	0	0	8	8
REGULUS VOYAGER	C6FE6	Oakland	0	0	35	58	42	48	3	1	24	68	15	19	313
RESOLUTION	WBR6941	Kodiak	0	0	0	0	0	0	0	0	0	1	0	0	1
RHAPSODY OF THE SEAS	LAZK4	Houston	75	42	30	33	30	61	40	20	25	43	24	9	432
RHINE FOREST	V7EI9	New Orleans	0	0	0	0	0	0	0	0	0	21	64	62	147
RICHARD H MATZKE	C6FE5	Oakland	9	42	31	15	47	32	26	64	60	7	47	25	405
RICKMERS HAMBERG	V7DS3	New Orleans	0	0	0	0	0	0	0	0	0	18	0	2	20
ROBERT C. SEAMENS	WDA4486	Kodiak	0	0	0	0	0	0	0	0	0	30	39	7	76
ROBERT L.	WTW9264	Kodiak	0	1	1	0	0	0	0	0	0	0	0	0	2
ROGER BLOUGH	WZP8164	Chicago	29	0	0	0	1	0	0	0	0	1	18	61	110
ROGER REVELLE	KAOU	New Orleans	97	39	70	10	35	43	48	50	49	56	20	90	607
ROTTERDAM	PDGS	Anchorage	0	0	0	0	0	0	0	0	0	0	27	64	91
ROUGHNECK	WTW9262	Kodiak	3	13	9	4	5	6	7	8	0	0	0	11	66
ROYAL PRINCESS	GBRP	Long Beach	0	0	0	0	0	0	0	0	0	0	0	2	2
RUBIN ARTEMIS	3FAH7	Seattle	29	33	17	18	22	17	35	35	36	14	17	32	305
RUBIN PEARL	YJQA8	Seattle	0	27	70	54	36	47	40	74	23	81	16	70	538
RUFF & REDDY	WY4096	Kodiak	0	0	0	0	0	0	0	0	0	0	1	0	1

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RYNDAM	PHFV	Miami	0	0	12	1	0	0	0	0	0	0	1	1	15
SAFMARINE ZAMBEZI	A8CE9	New York City	0	0	0	0	0	18	43	26	24	49	54	61	275
SALISHAN	WUT4384	Kodiak	5	2	0	0	0	0	0	0	0	0	0	0	7
SALLY MAERSK	OZHS2	Seattle	57	0	2	86	0	0	34	17	0	9	18	0	223
SAM M. TAALAK	WCX5321	Kodiak	0	0	0	0	0	0	0	0	0	18	36	0	54
SAMSON MARINER	WCN3586	Kodiak	6	2	6	6	14	2	10	5	6	14	11	0	82
SANDRA FOSS	WYL4908	Kodiak	0	0	0	0	11	10	0	0	1	19	0	0	41
SANTA BARBARA	ELOT3	Seattle	40	21	25	17	27	15	20	20	26	28	27	48	314
SAPPHIRE PRINCESS	ZCDG7	Anchorage	0	0	0	0	0	0	0	0	1	30	102	172	305
SAUDI ABHA	HZRX	Baltimore	33	3	44	41	23	10	29	37	57	23	31	19	350
SAUDI DIRIYAH	HZZB	Houston	43	19	29	75	29	30	34	13	0	0	0	0	272
SAUDI HOFUF	HZZC	Houston	57	62	2	67	40	27	39	0	38	118	18	44	512
SAUDI TABUK	HZZD	Houston	37	68	77	56	40	16	11	124	60	55	54	49	647
SCHACKENBORG	ZCIH7	Houston	0	0	27	20	10	38	40	65	24	3	50	29	306
SEA NOVIA	ELRV2	Miami	0	0	0	0	0	0	0	0	0	9	13	14	36
SEA PRINCE	WYT8569	Anchorage	0	0	0	0	50	83	68	50	85	63	3	0	402
SEA RANGER	WBM8733	Anchorage	0	0	22	13	19	19	21	8	11	26	0	0	139
SEA RELIANCE	WEOB	Kodiak	18	17	14	1	0	0	0	0	0	1	0	0	51
SEA STORM	WCV9132	Kodiak	0	0	0	0	0	5	12	0	0	0	0	0	17
SEA VENTURE	WCC7684	Anchorage	0	0	0	0	16	5	14	0	0	0	29	55	119
SEA VICTORY	WCY6777	Anchorage	0	0	0	0	0	0	14	0	0	0	0	0	14
SEA VIKING	WCE8951	Anchorage	0	0	0	0	20	9	0	31	7	21	54	0	142
SEA VOYAGER	WCX9106	Valdez	0	0	0	0	0	0	33	52	43	39	28	27	222
SEA-LAND DEFENDER	KGJB	Oakland	49	44	49	0	17	44	87	60	44	96	15	86	591
SEA-LAND PATRIOT	KHRF	Oakland	53	63	12	41	50	54	39	59	70	60	26	70	597
SEABULK ARCTIC	WCY7054	Kodiak	24	26	24	15	6	10	18	48	53	12	21	48	305
SEABULK MONTANA	WCW9126	Anchorage	90	120	68	19	114	102	84	117	59	69	108	308	1258
SEABULK PRIDE	WCY7052	Kodiak	35	38	21	8	24	17	52	26	9	23	29	12	294
SEABULK TRADER	KNJK	Oakland	0	0	0	0	0	0	0	0	0	0	15	37	52
SEALAND ACHIEVER	WPKD	Houston	53	41	46	31	41	40	43	34	41	103	61	60	594
SEALAND ATLANTIC	KRLZ	Houston	77	65	99	63	48	105	54	38	15	18	12	44	638
SEALAND CHAMPION	MCDZ2	Oakland	40	10	6	0	3	3	3	0	16	12	33	56	182
SEALAND COMET	MCDZ7	Norfolk	15	45	17	18	23	22	9	0	25	22	8	0	204
SEALAND COMMITMENT	KRPB	Houston	90	62	104	52	88	63	56	67	54	34	60	53	783
SEALAND DEVELOPER	KHRH	Houston	67	30	30	105	41	23	53	88	55	45	17	52	606
SEALAND EAGLE	MCDZ9	Long Beach	20	23	11	20	3	14	3	12	21	34	4	3	168
SEALAND EXPRESS	KGJD	Long Beach	15	61	297	334	498	361	301	317	431	585	436	476	4112
SEALAND FLORIDA	KRHX	Houston	114	93	55	59	49	46	34	46	41	84	33	39	693
SEALAND FREEDOM	V7AM3	Norfolk	0	0	0	7	25	23	14	39	39	32	23	27	229
SEALAND INDEPENDENCE	WGJC	Long Beach	0	0	0	0	0	0	0	0	3	56	41	29	129
SEALAND INNOVATOR	WGKF	Oakland	40	48	47	61	70	54	45	61	52	49	47	61	635
SEALAND INTEGRITY	WPVD	Houston	277	330	177	141	159	181	246	231	231	257	209	140	2579
SEALAND INTREPID	9VWZ	Charleston	21	16	21	31	30	9	37	1	13	27	4	0	210
SEALAND LIBERATOR	KHRP	Oakland	41	57	41	0	0	0	26	38	22	27	41	45	338
SEALAND LIGHTNING	WDB9986	Seattle	0	0	0	0	0	0	0	0	0	17	0	0	17
SEALAND MARINER	V7AM5	New York City	0	0	0	0	0	0	0	0	0	0	3	45	48
SEALAND MERCURY	MCDW9	Oakland	26	26	30	31	37	32	28	27	15	42	66	62	422
SEALAND METEOR	MCDW3	Miami	0	0	9	31	22	21	24	22	47	33	18	0	227
SEALAND MOTIVATOR	WAAH	Houston	89	80	98	150	90	88	27	0	46	68	22	55	813
SEALAND PERFORMANCE	KRPD	Houston	32	90	78	64	43	19	50	56	58	42	53	44	629

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SEALAND PRIDE	WDB9444	Houston	0	0	0	0	0	0	0	0	22	136	64	62	284
SEALAND QUALITY	KRNJ	Houston	57	57	95	62	44	9	48	33	28	28	11	9	481
SEALAND RACER	MCDW2	Charleston	46	29	4	4	48	0	27	0	45	2	25	24	254
SEALAND VOYAGER	KHRK	Long Beach	69	72	60	26	9	6	40	82	81	96	74	75	690
SEARIVER BAYTOWN	KFPM	Valdez	0	0	0	0	0	0	2	1	1	0	3	3	10
SEARIVER COLUMBIA BAY	WFQE	Long Beach	0	0	0	0	0	0	0	0	0	5	1	10	16
SELMA KALKAVAN	TCSX	Norfolk	21	48	36	23	19	17	42	29	40	52	32	32	391
SENECA	WBN8469	Anchorage	0	0	0	60	83	99	215	452	115	70	0	0	1094
SENSATION	C6FM8	Miami	0	0	0	0	0	0	0	0	0	4	11	23	38
SHEILA MCDEVITT	WDA4069	New Orleans	23	22	12	3	2	3	5	9	68	2	0	0	149
SHIRAOI MARU	3ECM7	Seattle	0	0	0	0	0	13	0	0	0	0	0	0	13
SIDNEY FOSS	WYL5445	Kodiak	0	0	0	19	32	12	4	7	5	0	4	13	96
SIKU	WCQ6174	Anchorage	0	0	0	0	0	0	0	0	0	2	0	0	2
SINE MAERSK	OZOK2	Seattle	0	40	0	8	34	0	0	0	17	0	0	25	124
SINUK	WCQ8110	Anchorage	0	0	0	93	171	139	146	160	157	106	0	0	972
SIOUX	WBN7617	Anchorage	0	0	0	0	1	60	79	171	92	133	102	0	638
SKANDERBORG	ZCIG4	Houston	31	0	0	0	16	15	5	14	22	28	0	0	131
SKAUGRAN	LADB2	Seattle	18	48	42	65	10	0	4	14	3	33	13	8	258
SKODSBORG	ZCIJ7	Baltimore	0	17	33	39	20	9	24	27	22	19	39	24	273
SKY PRINCESS	GYYP	Anchorage	0	0	0	0	0	0	0	0	0	211	225	227	663
SNOHOMISH	WSQ8098	Kodiak	0	0	2	0	0	0	0	0	0	0	0	0	2
SNOW DRIFT	ZCGL3	Anchorage	0	0	0	0	0	0	0	0	0	0	1	0	1
SOFIE MAERSK	OZUN2	Seattle	0	0	0	43	19	0	21	11	0	0	33	37	164
SOL DO BRASIL	ELQQ4	Baltimore	5	6	15	36	53	26	29	15	3	6	2	3	199
SOLAR WING	ELJS7	Jacksonville	94	92	98	100	103	92	100	105	96	107	93	102	1182
SOROE MAERSK	OYKJ2	Seattle	37	28	0	0	25	10	0	13	10	0	0	7	130
SOUND RELIANCE	WXAE	Kodiak	24	12	16	13	9	6	1	0	0	4	0	30	115
SOUTHDOWN CHALLENGER	WDB9135	Chicago	0	0	0	0	0	0	0	0	0	0	1	18	19
SOVEREIGN MAERSK	OYGA2	Seattle	0	0	0	15	21	0	40	24	0	0	9	40	149
SPIRIT	3TFU9	Kodiak	0	0	0	0	0	9	23	13	17	1	12	8	83
SS BADGER	WBD4889	Chicago	0	0	0	0	0	0	0	0	12	7	0	0	19
ST PAUL RESEARCH	KEY796	Anchorage	0	0	0	0	0	0	0	1	0	0	0	0	1
STACEY FOSS	WYL4909	Kodiak	0	0	0	0	0	14	0	0	0	16	7	0	37
STAR ALABAMA	LAVU4	Baltimore	35	50	65	37	43	15	49	9	46	15	37	4	405
STAR AMERICA	LAVV4	Jacksonville	43	38	21	27	41	16	1	57	22	18	28	20	332
STAR DOVER	LAEP4	Seattle	43	0	0	42	0	30	28	0	28	1	9	14	195
STAR EAGLE	LAWO2	Baltimore	57	30	11	0	7	32	43	62	10	17	17	25	311
STAR EVVIVA	LAHE2	Jacksonville	61	49	0	29	8	3	0	0	43	28	12	4	237
STAR FLORIDA	LAVW4	Houston	24	0	25	0	17	0	54	0	25	0	0	0	145
STAR FRASER	LAVY4	Houston	0	44	23	2	41	9	22	33	3	28	0	0	205
STAR GEIRANGER	LAKQ5	Norfolk	31	34	0	33	36	0	32	31	0	35	45	27	304
STAR GRAN	LADR4	Long Beach	0	0	0	0	0	0	30	0	0	0	0	0	30
STAR GRINDANGER	LAKR5	Norfolk	5	44	9	0	22	26	0	0	0	0	0	39	145
STAR HANSA	LAXP4	Jacksonville	12	0	6	19	0	0	2	9	0	1	15	6	70
STAR HARMONIA	LAGB5	Baltimore	78	18	24	47	0	28	58	24	6	43	28	11	365
STAR HERDLA	LAVD4	Baltimore	0	49	22	1	16	21	0	24	27	0	31	25	216
STAR HIDRA	LAVN4	Baltimore	0	0	30	9	0	33	32	0	40	20	35	57	256
STAR INDIANA	S6BE	Baltimore	21	8	56	55	55	33	25	18	0	0	0	27	298
STAR ISMENE	LANT5	Baltimore	31	45	56	28	31	27	31	14	39	55	27	37	421

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
STAR ISTIND	LAMP5	Houston	30	28	4	8	7	3	0	0	0	0	0	0	80
STAR JAPAN	LAZV5	Baltimore	0	0	0	0	0	0	0	0	0	13	52	34	99
STAR PRINCESS	ZCDD6	Anchorage	0	0	0	0	0	0	0	0	0	4	13	4	21
STATENDAM	PHSG	Miami	16	13	9	14	4	4	15	9	7	11	21	27	150
STELLAR VOYAGER	C6FV4	Seattle	0	9	35	33	17	21	2	11	15	0	3	38	184
STEWART J. CORT	WDB4570	Chicago	15	0	0	42	16	0	0	0	6	22	25	14	140
STIMSON	WCY2270	Kodiak	26	6	5	77	4	4	10	0	16	27	0	0	175
STRONG PATRIOT	WCZ8589	Norfolk	0	10	34	2	25	1	0	0	5	0	0	0	77
SUN PRINCESS	ZCBU6	Anchorage	0	0	0	0	0	0	0	0	0	14	40	40	94
SUSAN MAERSK	OYIK2	Seattle	2	0	6	1	0	8	9	0	32	25	10	0	93
SUSAN W. HANNAH	WAH9146	Chicago	0	0	0	0	0	0	0	0	0	6	1	1	8
SVEND MAERSK	OYJS2	Seattle	0	0	0	25	1	0	52	43	5	0	7	0	133
SVENDBORG MAERSK	OZSK2	Seattle	0	19	27	0	13	37	0	0	0	0	0	0	96
T/V ENTERPRISE	KVMU	New York City	15	74	0	0	0	0	0	0	0	0	0	0	89
T/V STATE OF MAINE	WCAH	New York City	0	0	0	0	15	74	0	0	0	0	0	0	89
TAHITIAN PRINCESS	ZDDY8	Anchorage	0	0	0	0	0	0	0	0	0	65	61	25	151
TAKASAGO	LACR5	Baltimore	35	32	19	0	0	7	29	0	0	0	0	0	122
TAKU	WI9491	Kodiak	13	9	9	11	26	12	0	8	2	0	0	0	90
TALISMAN	LAOW5	Jacksonville	21	17	0	0	15	7	0	22	13	0	0	0	95
TAMESIS	LAOL5	Norfolk	18	13	11	0	6	0	0	0	23	10	0	0	81
TAMPA	LMWO3	Baltimore	0	0	0	0	0	9	18	0	32	18	21	0	98
TAUSALA SAMOA	V2FA2	Long Beach	17	57	64	86	67	92	62	60	35	41	17	38	636
TENACIOUS	WTK2123	Kodiak	0	0	0	0	0	1	0	0	0	0	0	0	1
TEXAS CLIPPER II	KVWA	Houston	0	0	0	0	0	60	74	8	0	0	0	0	142
THOMAS G. THOMPSON	KTDQ	Seattle	0	20	20	30	40	20	20	0	0	0	0	0	150
TITAN	WAW9232	Kodiak	7	5	7	4	9	2	8	2	0	8	13	16	81
TMM CAMPECHE	VSXC9	Houston	2	2	1	0	0	0	1	16	20	10	0	7	59
TMM JALISCO	ZCDJ7	Anchorage	0	0	0	0	0	0	0	0	0	0	3	7	10
TMM TABASCO	VSUA5	Anchorage	0	0	0	0	0	0	0	56	65	85	95	79	380
TONSINA	KJDG	Kodiak	11	30	9	11	14	1	6	6	19	12	8	8	135
TREIN MAERSK	MSQQ8	Baltimore	47	22	46	17	18	40	28	0	11	25	9	10	273
TRIDENT	WCZ2913	Kodiak	1	0	1	6	0	0	1	1	0	7	1	0	18
TROJAN STAR	C6OD7	Baltimore	0	0	0	0	0	0	0	0	0	1	0	0	1
TT PAUL	KNFD	Valdez	0	0	0	0	0	0	0	0	0	26	0	0	26
TUSTUMENA	WNGW	Kodiak	106	25	0	19	63	24	41	110	182	59	34	48	711
TYCO DECISIVE	V7DI7	Baltimore	0	0	37	53	0	0	0	0	0	0	0	0	90
TYCO DURABLE	V7DI8	Baltimore	0	0	0	0	0	0	0	0	0	0	0	32	32
TYCO RESPONDER	V7CY9	Baltimore	48	12	0	3	0	0	0	0	3	0	43	57	166
TYCOM RELIANCE	V7CZ2	Baltimore	0	0	0	0	0	0	0	0	22	0	0	0	22
UBC SAIKI	P3GY9	Seattle	4	41	50	39	22	21	18	76	49	48	48	36	452
UBC SVEA	P3JA8	Seattle	0	0	0	0	0	0	0	0	12	65	71	47	195
UNITED SPIRIT	ELYB2	Seattle	70	87	66	96	84	71	63	0	37	62	38	73	747
USCGC ACUSHNET (WMEC 167)	NNHA	Kodiak	0	0	0	0	0	0	0	0	0	14	5	0	19
USCGC ALEX HALEY	NZPO	Kodiak	0	5	4	0	0	0	0	0	0	0	0	7	16
USCGC EAGLE	NRCB	Kodiak	1	0	0	0	0	0	0	0	0	0	0	0	1
USCGC HEALY	NEPP	Seattle	0	0	2	5	143	119	71	40	75	116	12	0	583
USCGC MACKINAW	NRKP	Chicago	2	3	0	0	0	0	10	0	0	0	0	1	16
USCGC MAPLE (WLB 207)	NWBE	Kodiak	0	0	0	0	0	0	0	1	0	0	0	0	1
USCGC MIDGETT (WHEC 726)	NHWR	Seattle	0	0	0	0	0	23	9	0	0	0	0	0	32

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USCGC POLAR SEA	NRUO	Seattle	62	64	4	0	0	0	0	0	0	1	0	0	131
USCGC POLAR STAR	NBTM	Seattle	114	89	131	52	0	0	0	0	0	0	117	116	619
USCGC SHERMAN	NMMJ	Kodiak	0	0	0	0	0	0	0	0	0	0	0	19	19
USCGC SPAR	NJAR	Kodiak	0	0	0	0	0	1	0	0	0	0	0	0	1
USCGC STORIS	NRUC	Kodiak	7	0	0	0	0	25	0	0	0	0	0	0	32
USNS MARY SEARS (T-AGS 6)	NRFR	Houston	1	0	0	0	0	0	0	0	0	0	0	0	1
VEENDAM	C6NL6	Miami	0	0	0	0	0	0	0	0	0	0	0	23	23
VIKING STAR	WAS4138	Kodiak	10	5	3	3	2	0	0	0	6	7	0	5	41
VIRGINIA BRIDGE	HOKP	Anchorage	0	0	0	0	0	0	0	0	0	0	0	11	11
VIRGINIAN	KSPH	Oakland	0	20	22	48	58	34	0	59	49	53	0	16	359
VLADIVOSTOK	UBXP	Seattle	41	59	71	61	57	49	23	20	23	38	36	45	523
VOLENDAM	PCHM	Anchorage	0	0	0	0	0	0	0	0	0	4	42	34	80
VOYAGER OF THE SEAS	C6SE5	Miami	0	0	1	4	0	0	0	0	0	0	1	0	6
WASHINGTON VOYAGER	KFDB	Oakland	1	10	5	8	5	5	0	2	0	0	7	11	54
WECOMA	WSD7079	Seattle	0	28	4	4	78	89	77	74	71	31	0	14	470
WESTERN MARINER	WRB9690	Anchorage	1	0	0	0	0	0	1	0	0	1	0	1	4
WESTERN NAVIGATOR	WAX7602	Anchorage	0	0	0	0	14	0	0	0	0	0	0	0	14
WESTERN RANGER	WBN3008	Anchorage	0	0	0	0	39	31	23	0	19	21	0	0	133
WESTWARD VENTURE	KHJB	Seattle	0	0	13	9	26	0	0	0	0	0	0	30	78
WESTWOOD ANETTE	C6QO9	Seattle	30	7	3	4	21	13	17	2	16	1	13	27	154
WESTWOOD BORG	LAON4	Seattle	72	73	48	64	61	31	42	0	0	0	0	0	391
WESTWOOD BREEZE	LAOT4	Seattle	46	14	21	8	12	7	0	0	0	0	25	3	136
WESTWOOD COLUMBIA	C6SI4	Seattle	38	38	24	27	20	25	27	42	43	25	33	28	370
WESTWOOD MARIANNE	C6QD3	Seattle	63	45	42	69	52	48	65	79	0	72	44	52	631
WESTWOOD RAINIER	C6SI3	Seattle	56	24	27	11	48	37	41	40	17	12	15	8	336
WESTWOOD VICTORIA	C6SI6	Seattle	49	41	41	41	39	69	72	63	41	80	71	45	652
WILFRED SYKES	WDA2769	Chicago	0	0	0	34	20	10	22	31	25	43	26	11	222
WILSON	WNPD	New Orleans	36	16	27	20	28	33	31	8	24	6	22	9	260
WOLDSTAD	WCY2271	Kodiak	19	30	31	7	11	28	41	5	0	42	0	0	214
WORLD SPIRIT	ELWG7	Seattle	22	60	49	21	37	29	42	42	55	49	19	60	485
YM GENOVA II	ELVX2	New York City	0	0	0	0	0	0	0	27	71	76	71	58	303
ZAANDAM	PDAN	Miami	0	0	0	0	0	0	0	0	0	10	20	0	30
ZENITH	C6FU3	Miami	0	0	0	0	0	0	0	0	0	0	0	11	11
ZENITH	WBV3237	Kodiak	0	1	2	2	2	0	0	1	0	3	9	0	20
ZIM AMERICA	4XGR	New York City	36	0	44	15	0	27	20	0	9	54	0	0	205
ZIM ITALIA	4XGT	New Orleans	0	47	0	4	65	0	0	53	0	19	52	0	240
ZIM KOREA	4XGU	Miami	0	0	0	23	13	0	37	6	1	24	28	0	132
ZIM PANAMA	VSWW5	Miami	0	0	0	0	0	0	0	31	18	16	34	5	104
ZUIDERDAM	PBIG	Anchorage	0	0	0	0	0	0	0	0	0	1	3	0	4

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
TOTAL SHIPS: 775	13010	13542	13794	14696	15587	14346	17045	17373	17082	18829	16633	18035	189972

VOS Cooperative Ship Report
January through February 2005

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1ST LT HARRY L. MARTIN	NDFH	Jacksonville	1	0	0	0	0	0	0	0	0	0	0	0	1
2ND LT JOHN P. BOBO	WJKH	Norfolk	39	59	0	0	0	0	0	0	0	0	0	0	98
ADMIRALTY WIND	WCY7687	Anchorage	0	4	0	0	0	0	0	0	0	0	0	0	4
ADVANTAGE	WPPO	Norfolk	46	26	0	0	0	0	0	0	0	0	0	0	72
AKASHI BRIDGE	H3QM	Anchorage	0	11	0	0	0	0	0	0	0	0	0	0	11
AKINADA BRIDGE	H9PN	Anchorage	0	35	0	0	0	0	0	0	0	0	0	0	35
ALASKAN LEADER	WDB7918	Kodiak	86	4	0	0	0	0	0	0	0	0	0	0	90
ALBEMARLE ISLAND	C6LU3	Miami	9	21	0	0	0	0	0	0	0	0	0	0	30
ALERT	WCZ7335	Valdez	7	1	0	0	0	0	0	0	0	0	0	0	8
ALIANCA SHANGHAI	A8CQ5	New York City	8	4	0	0	0	0	0	0	0	0	0	0	12
ALTAIR VOYAGER	C6OK	Baltimore	10	11	0	0	0	0	0	0	0	0	0	0	21
AMSTERDAM	PBAD	Anchorage	20	28	0	0	0	0	0	0	0	0	0	0	48
APL AMAZONITE	9VBX	Long Beach	14	51	0	0	0	0	0	0	0	0	0	0	65
APL AUSTRALIA	A8FS8	New York City	3	26	0	0	0	0	0	0	0	0	0	0	29
APL CHINA	WDB3161	Long Beach	60	59	0	0	0	0	0	0	0	0	0	0	119
APL DALIAN	S6HU6	Norfolk	4	40	0	0	0	0	0	0	0	0	0	0	44
APL JAPAN	S6TS	Seattle	51	74	0	0	0	0	0	0	0	0	0	0	125
APL KENNEDY	9VAY4	Seattle	66	51	0	0	0	0	0	0	0	0	0	0	117
APL KOREA	WCX8883	Long Beach	24	14	0	0	0	0	0	0	0	0	0	0	38
APL PHILIPPINES	WCX8884	Long Beach	8	31	0	0	0	0	0	0	0	0	0	0	39
APL SINGAPORE	WCX8812	Long Beach	40	37	0	0	0	0	0	0	0	0	0	0	77
APL SPINEL	9VVK	Seattle	37	17	0	0	0	0	0	0	0	0	0	0	54
APL SWEDEN	9VYY5	Seattle	26	33	0	0	0	0	0	0	0	0	0	0	59
APL THAILAND	WCX8882	Long Beach	58	25	0	0	0	0	0	0	0	0	0	0	83
APL TURQUOISE	9VVY	Oakland	19	23	0	0	0	0	0	0	0	0	0	0	42
ARAL SEA	S6CD2	Houston	0	50	0	0	0	0	0	0	0	0	0	0	50
ARCTIC SUN	ELQB8	Anchorage	62	247	0	0	0	0	0	0	0	0	0	0	309
ARIZONA VOYAGER	KGBE	Miami	8	30	0	0	0	0	0	0	0	0	0	0	38
ATLANTIC FOREST	WDB2122	New Orleans	4	0	0	0	0	0	0	0	0	0	0	0	4
ATLANTIC OCEAN	C6T2064	New York City	26	44	0	0	0	0	0	0	0	0	0	0	70
ATTENTIVE	WCZ7337	Valdez	30	17	0	0	0	0	0	0	0	0	0	0	47
AWARE	WCZ7336	Valdez	13	21	0	0	0	0	0	0	0	0	0	0	34
BARENTS SEA	9VAP5	New York City	22	35	0	0	0	0	0	0	0	0	0	0	57
BARRINGTON ISLAND	C6QK	Miami	46	45	0	0	0	0	0	0	0	0	0	0	91
BAUHINIA BRIDGE	VRZZ5	Anchorage	44	32	0	0	0	0	0	0	0	0	0	0	76
BERNARDO QUINTANA A	C6KJ5	New Orleans	55	20	0	0	0	0	0	0	0	0	0	0	75
BILLIE H.	WCY4992	Kodiak	2	0	0	0	0	0	0	0	0	0	0	0	2
BLUEFIN	WQZ9646	Kodiak	0	9	0	0	0	0	0	0	0	0	0	0	9
BOUCHARD BOYS	WCY7761	Kodiak	1	0	0	0	0	0	0	0	0	0	0	0	1
BOWFIN	WSX7318	Kodiak	0	2	0	0	0	0	0	0	0	0	0	0	2
BRUCE	WWU8	Anchorage	23	26	0	0	0	0	0	0	0	0	0	0	49
BULWARK	WBN4113	Valdez	13	7	0	0	0	0	0	0	0	0	0	0	20
BURNS HARBOR	WDB4745	Chicago	2	0	0	0	0	0	0	0	0	0	0	0	2
CAJUN EXPRESS	ELXL3	Houston	8	73	0	0	0	0	0	0	0	0	0	0	81
CALA PRODENCIA	ELRV2	Miami	1	0	0	0	0	0	0	0	0	0	0	0	1
CANMAR DYNASTY	VSXC4	Anchorage	1	2	0	0	0	0	0	0	0	0	0	0	3
CANMAR ENDURANCE	ZCBE7	Unknown	23	0	0	0	0	0	0	0	0	0	0	0	23
CANMAR HONOUR	ZCBP5	Anchorage	31	37	0	0	0	0	0	0	0	0	0	0	68

VOS Cooperative Ship Report

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
CANMAR PRIDE	ZCBP6	Anchorage	27	37	0	0	0	0	0	0	0	0	0	0	64
CANMAR PROMISE	ELXZ9	Anchorage	88	40	0	0	0	0	0	0	0	0	0	0	128
CANMAR SPIRIT	MAHG5	Anchorage	1	3	0	0	0	0	0	0	0	0	0	0	4
CANMAR VENTURE	VQLL5	Anchorage	16	10	0	0	0	0	0	0	0	0	0	0	26
CAP DOUKATO	A8EW3	Charleston	11	0	0	0	0	0	0	0	0	0	0	0	11
CAP SAN ANTONIO	ELZU6	Norfolk	31	31	0	0	0	0	0	0	0	0	0	0	62
CAPE LILA	3EMQ9	Anchorage	34	42	0	0	0	0	0	0	0	0	0	0	76
CAPT STEVEN L BENNETT	KAXO	New Orleans	6	7	0	0	0	0	0	0	0	0	0	0	13
CARIBBEAN PRINCESS	ZCDG8	Anchorage	40	9	0	0	0	0	0	0	0	0	0	0	49
CARNIVAL CONQUEST	3FPQ9	New Orleans	3	9	0	0	0	0	0	0	0	0	0	0	12
CARNIVAL DESTINY	C6FN4	Miami	7	4	0	0	0	0	0	0	0	0	0	0	11
CARNIVAL GLORY	3FPS9	Jacksonville	7	0	0	0	0	0	0	0	0	0	0	0	7
CARNIVAL PRIDE	H3VU	Miami	4	0	0	0	0	0	0	0	0	0	0	0	4
CARNIVAL TRIUMPH	C6FN5	Miami	18	8	0	0	0	0	0	0	0	0	0	0	26
CARNIVAL VICTORY	3FFL8	Miami	16	11	0	0	0	0	0	0	0	0	0	0	27
CARSTEN MAERSK	OZYB2	Seattle	6	27	0	0	0	0	0	0	0	0	0	0	33
CASON J. CALLAWAY	WE4879	Chicago	31	0	0	0	0	0	0	0	0	0	0	0	31
CAST PREMIER	ZCDH7	Anchorage	26	9	0	0	0	0	0	0	0	0	0	0	35
CAST PROSPECT	ZCBD3	Anchorage	21	5	0	0	0	0	0	0	0	0	0	0	26
CELEBRATION	H3GQ	Jacksonville	15	0	0	0	0	0	0	0	0	0	0	0	15
CELINE	HBEF	New York City	0	1	0	0	0	0	0	0	0	0	0	0	1
CENTURY	C6FU5	Miami	9	10	0	0	0	0	0	0	0	0	0	0	19
CENTURY HIGHWAY #2	3EJB9	Long Beach	17	16	0	0	0	0	0	0	0	0	0	0	33
CHANG JIANG BRIDGE	3EZJ9	Seattle	37	54	0	0	0	0	0	0	0	0	0	0	91
CHARLES ISLAND	C6JT	Miami	50	65	0	0	0	0	0	0	0	0	0	0	115
CHARLES M. BEEGHLEY	WL3108	Chicago	12	0	0	0	0	0	0	0	0	0	0	0	12
CHARLESTON	WBVY	Houston	0	5	0	0	0	0	0	0	0	0	0	0	5
CHEMICAL TRADER	KRGJ	Houston	3	10	0	0	0	0	0	0	0	0	0	0	13
CHESAPEAKE BAY	WMLH	Norfolk	43	55	0	0	0	0	0	0	0	0	0	0	98
CHIQUITA BELGIE	C6KD7	Baltimore	37	34	0	0	0	0	0	0	0	0	0	0	71
CHIQUITA BREMEN	ZCBC5	Miami	37	23	0	0	0	0	0	0	0	0	0	0	60
CHIQUITA DEUTSCHLAND	C6KD8	Baltimore	48	51	0	0	0	0	0	0	0	0	0	0	99
CHIQUITA ITALIA	C6KD5	Baltimore	44	50	0	0	0	0	0	0	0	0	0	0	94
CHIQUITA NEDERLAND	C6KD6	Baltimore	45	45	0	0	0	0	0	0	0	0	0	0	90
CHIQUITA SCANDINAVIA	C6KD4	Baltimore	57	52	0	0	0	0	0	0	0	0	0	0	109
CHIQUITA SCHWEIZ	C6KD9	Baltimore	40	47	0	0	0	0	0	0	0	0	0	0	87
CLEVELAND	KGXA	Houston	49	28	0	0	0	0	0	0	0	0	0	0	77
CMA CGM KINGSTON	A8CS3	New York City	33	12	0	0	0	0	0	0	0	0	0	0	45
COASTAL NAVIGATOR	WCY9686	Seattle	0	5	0	0	0	0	0	0	0	0	0	0	5
COASTAL PILOT	WBP7281	Kodiak	1	3	0	0	0	0	0	0	0	0	0	0	4
COASTAL RELIANCE	WADZ	Kodiak	45	98	0	0	0	0	0	0	0	0	0	0	143
COLLIER BROTHERS	WUU7551	Kodiak	2	1	0	0	0	0	0	0	0	0	0	0	3
COLORADO VOYAGER	KLHZ	Oakland	1	2	0	0	0	0	0	0	0	0	0	0	3
COLUMBINE MAERSK	OUHC2	Seattle	0	53	0	0	0	0	0	0	0	0	0	0	53
COLUMBUS VICTORIA	P3RF8	Norfolk	21	17	0	0	0	0	0	0	0	0	0	0	38
CONTSHIP ROME	ELVZ6	Norfolk	34	11	0	0	0	0	0	0	0	0	0	0	45
CORAL SEA	C6YW	Miami	16	23	0	0	0	0	0	0	0	0	0	0	39
CORMORANT ARROW	C6IO9	Seattle	0	21	0	0	0	0	0	0	0	0	0	0	21
CORNELIA MAERSK	OWWS2	Seattle	10	0	0	0	0	0	0	0	0	0	0	0	10
CORWITH CRAMER	WTF3319	Kodiak	5	0	0	0	0	0	0	0	0	0	0	0	5
COSCO NORFOLK	P3ZY6	Norfolk	18	14	0	0	0	0	0	0	0	0	0	0	32
COURTNEY L	ZCAQ8	Baltimore	23	32	0	0	0	0	0	0	0	0	0	0	55

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
CSCL CHIWAN	P3CE9	Anchorage	34	23	0	0	0	0	0	0	0	0	0	0	57
CSCL FELIXSTOWE	P3KM9	Anchorage	0	10	0	0	0	0	0	0	0	0	0	0	10
CSCL FUZHOU	ELYA7	Anchorage	7	19	0	0	0	0	0	0	0	0	0	0	26
CSCL LOS ANGELES	A8AX8	Anchorage	18	22	0	0	0	0	0	0	0	0	0	0	40
CSCL NINGBO	P3GT9	Anchorage	32	18	0	0	0	0	0	0	0	0	0	0	50
CSL CABO	D5XH	Seattle	16	15	0	0	0	0	0	0	0	0	0	0	31
CYNTHIA FAGAN	KSDF	Houston	64	39	0	0	0	0	0	0	0	0	0	0	103
DAIO ANDES	3FDN9	Anchorage	9	76	0	0	0	0	0	0	0	0	0	0	85
DAWN PRINCESS	ZCBU2	Miami	41	36	0	0	0	0	0	0	0	0	0	0	77
DEEPWATER HORIZON	V7HC9	Houston	5	126	0	0	0	0	0	0	0	0	0	0	131
DEEPWATER MILLENNIUM	V7HD2	Houston	25	37	0	0	0	0	0	0	0	0	0	0	62
DELAWARE BAY	WMLG	Norfolk	30	20	0	0	0	0	0	0	0	0	0	0	50
DELAWARE BRIDGE	V2OE2	New York City	46	25	0	0	0	0	0	0	0	0	0	0	71
DIAMOND PRINCESS	ZCDF8	Anchorage	37	21	0	0	0	0	0	0	0	0	0	0	58
DIRCH MAERSK	OXQP2	Long Beach	20	29	0	0	0	0	0	0	0	0	0	0	49
DIRECT CONDOR	A8AL3	Anchorage	59	12	0	0	0	0	0	0	0	0	0	0	71
DIRECT JABIRU	A8CF4	Anchorage	41	65	0	0	0	0	0	0	0	0	0	0	106
DIRECT KEA	ELVZ7	Anchorage	1	39	0	0	0	0	0	0	0	0	0	0	40
DIRECT KESTREL	A8ET9	Anchorage	0	42	0	0	0	0	0	0	0	0	0	0	42
DISCOVERER DEEP SEAS	V7HC6	New Orleans	0	5	0	0	0	0	0	0	0	0	0	0	5
DISCOVERER ENTERPRISE	V7HD3	New Orleans	1	0	0	0	0	0	0	0	0	0	0	0	1
DISCOVERER SPIRIT	V7HC8	Houston	22	16	0	0	0	0	0	0	0	0	0	0	38
DREW FOSS	WYL5718	Kodiak	0	24	0	0	0	0	0	0	0	0	0	0	24
DUNCAN ISLAND	C6JS	Miami	45	41	0	0	0	0	0	0	0	0	0	0	86
ECSTASY	H3GR	Miami	10	7	0	0	0	0	0	0	0	0	0	0	17
EDYTH L	C6YC	Baltimore	28	34	0	0	0	0	0	0	0	0	0	0	62
EL MORRO	KCGH	Jacksonville	20	25	0	0	0	0	0	0	0	0	0	0	45
EL YUNQUE	WGJT	Jacksonville	41	22	0	0	0	0	0	0	0	0	0	0	63
ELATION	3FOC5	Miami	29	31	0	0	0	0	0	0	0	0	0	0	60
ENDEAVOR	WAUW	New York City	34	26	0	0	0	0	0	0	0	0	0	0	60
ENDURANCE	WAUU	New York City	19	31	0	0	0	0	0	0	0	0	0	0	50
ENDURANCE	WDA3359	Valdez	1	2	0	0	0	0	0	0	0	0	0	0	3
ENTERPRISE	WAUY	New York City	40	26	0	0	0	0	0	0	0	0	0	0	66
EOS I	P3BA7	Seattle	27	28	0	0	0	0	0	0	0	0	0	0	55
EVER DECENT	3FUO7	New York City	5	0	0	0	0	0	0	0	0	0	0	0	5
EVER DIADEM	3FOF8	New York City	9	2	0	0	0	0	0	0	0	0	0	0	11
EVER DIVINE	3FSA8	Norfolk	11	6	0	0	0	0	0	0	0	0	0	0	17
EVER DYNAMIC	3FUB8	New York City	3	0	0	0	0	0	0	0	0	0	0	0	3
EVER GRADE	3FOW2	Seattle	13	12	0	0	0	0	0	0	0	0	0	0	25
EVER RACER	3FJL4	New York City	0	8	0	0	0	0	0	0	0	0	0	0	8
EVER REACH	3FQO4	New York City	17	16	0	0	0	0	0	0	0	0	0	0	33
EVER REFINE	3FSB4	New York City	9	21	0	0	0	0	0	0	0	0	0	0	30
EVER REPUTE	3FRZ4	New York City	0	34	0	0	0	0	0	0	0	0	0	0	34
EVER ROUND	3FQN3	Long Beach	4	10	0	0	0	0	0	0	0	0	0	0	14
EVER UNIFIC	3FGB9	Anchorage	3	0	0	0	0	0	0	0	0	0	0	0	3
EVER UNISON	3FTL6	Seattle	0	1	0	0	0	0	0	0	0	0	0	0	1
EXPLORER OF THE SEAS	ELWX5	Miami	70	196	0	0	0	0	0	0	0	0	0	0	266
FALCON ARROW	C6TK8	Anchorage	0	19	0	0	0	0	0	0	0	0	0	0	19
FEDERAL HUNTER	VRWP2	New Orleans	0	7	0	0	0	0	0	0	0	0	0	0	7
FIGARO	S6PI	Baltimore	0	27	0	0	0	0	0	0	0	0	0	0	27
FRANCES L	C6YE	Baltimore	78	70	0	0	0	0	0	0	0	0	0	0	148
FRANK A. SHRONTZ	C6PZ3	Oakland	9	19	0	0	0	0	0	0	0	0	0	0	28

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
GALAXY	C6FU6	Miami	10	10	0	0	0	0	0	0	0	0	0	0	20
GALE WIND	WAZ9548	Anchorage	9	9	0	0	0	0	0	0	0	0	0	0	18
GEYSIR	WCZ5528	Norfolk	70	69	0	0	0	0	0	0	0	0	0	0	139
GLORIA	3FPA6	Seattle	66	56	0	0	0	0	0	0	0	0	0	0	122
GOLDEN GATE BRIDGE	H9HU	Anchorage	34	23	0	0	0	0	0	0	0	0	0	0	57
GOLDEN PRINCESS	ZCDA9	Anchorage	50	50	0	0	0	0	0	0	0	0	0	0	100
GRAND PRINCESS	ZCBU5	Anchorage	12	13	0	0	0	0	0	0	0	0	0	0	25
GREAT LAND	WFDP	Seattle	33	42	0	0	0	0	0	0	0	0	0	0	75
GREBE ARROW	C6OM7	Anchorage	0	22	0	0	0	0	0	0	0	0	0	0	22
GREEN DALE	WCZ5238	Jacksonville	14	2	0	0	0	0	0	0	0	0	0	0	16
GREEN LAKE	WDDI	Baltimore	27	43	0	0	0	0	0	0	0	0	0	0	70
GREEN POINT	WCY4148	New York City	36	30	0	0	0	0	0	0	0	0	0	0	66
GULF TITAN	WDA5598	Anchorage	3	18	0	0	0	0	0	0	0	0	0	0	21
GUS W. DARNELL	KCDK	Houston	14	16	0	0	0	0	0	0	0	0	0	0	30
HANJIN AMSTERDAM	DHDH	Anchorage	0	27	0	0	0	0	0	0	0	0	0	0	27
HANJIN BASEL	DHPU	Anchorage	71	97	0	0	0	0	0	0	0	0	0	0	168
HANJIN BRUSSELS	DIGW	Anchorage	0	24	0	0	0	0	0	0	0	0	0	0	24
HANJIN CHICAGO	A8CI2	Anchorage	25	57	0	0	0	0	0	0	0	0	0	0	82
HANJIN LISBON	A8BV2	Anchorage	28	25	0	0	0	0	0	0	0	0	0	0	53
HANJIN MADRID	DHQS	Anchorage	59	35	0	0	0	0	0	0	0	0	0	0	94
HANJIN OSAKA	A8FS4	New York City	0	30	0	0	0	0	0	0	0	0	0	0	30
HANJIN PHOENIX	A8CN9	Anchorage	36	33	0	0	0	0	0	0	0	0	0	0	69
HANJIN PRETORIA	A8CP6	Anchorage	39	40	0	0	0	0	0	0	0	0	0	0	79
HANJIN SHANGHAI	3FGI5	New York City	21	12	0	0	0	0	0	0	0	0	0	0	33
HANSA CENTURY	ELUP5	New York City	22	0	0	0	0	0	0	0	0	0	0	0	22
HANSA NARVIK	DINJ	Anchorage	20	19	0	0	0	0	0	0	0	0	0	0	39
HANSA VISBY	ELWR5	Anchorage	39	37	0	0	0	0	0	0	0	0	0	0	76
HATSU ELITE	VSJG7	Seattle	14	16	0	0	0	0	0	0	0	0	0	0	30
HATSU ENVOY	VSQL9	Seattle	17	27	0	0	0	0	0	0	0	0	0	0	44
HATSU ETHIC	VQFS4	Seattle	51	33	0	0	0	0	0	0	0	0	0	0	84
HATSU EXCEL	VSXV3	Seattle	6	6	0	0	0	0	0	0	0	0	0	0	12
HMI BRENTON REEF	WCY8453	Kodiak	37	31	0	0	0	0	0	0	0	0	0	0	68
HOLIDAY	C6FM6	New Orleans	0	7	0	0	0	0	0	0	0	0	0	0	7
HOOD ISLAND	C6LU4	Miami	30	20	0	0	0	0	0	0	0	0	0	0	50
HORIZON ENTERPRISE	KRGB	Oakland	68	114	0	0	0	0	0	0	0	0	0	0	182
HORIZON ANCHORAGE	KGTX	Anchorage	82	154	0	0	0	0	0	0	0	0	0	0	236
HORIZON CHALLENGER	WZJC	Jacksonville	65	22	0	0	0	0	0	0	0	0	0	0	87
HORIZON CONSUMER	WCHF	Long Beach	35	56	0	0	0	0	0	0	0	0	0	0	91
HORIZON CRUSADER	WZJF	Jacksonville	44	48	0	0	0	0	0	0	0	0	0	0	92
HORIZON DISCOVERY	WZJD	Jacksonville	49	46	0	0	0	0	0	0	0	0	0	0	95
HORIZON EXPEDITION	WPGJ	Seattle	37	47	0	0	0	0	0	0	0	0	0	0	84
HORIZON HAWAII	KIRF	New York City	0	51	0	0	0	0	0	0	0	0	0	0	51
HORIZON KODIAK	KGTZ	Anchorage	48	58	0	0	0	0	0	0	0	0	0	0	106
HORIZON NAVIGATOR	WPGK	Long Beach	35	30	0	0	0	0	0	0	0	0	0	0	65
HORIZON PACIFIC	WSRL	Long Beach	72	80	0	0	0	0	0	0	0	0	0	0	152
HORIZON PRODUCER	WJBJ	New York City	74	68	0	0	0	0	0	0	0	0	0	0	142
HORIZON RELIANCE	WFLH	Long Beach	71	66	0	0	0	0	0	0	0	0	0	0	137
HORIZON SPIRIT	WFLG	Oakland	62	56	0	0	0	0	0	0	0	0	0	0	118
HORIZON TACOMA	KGTY	Anchorage	91	58	0	0	0	0	0	0	0	0	0	0	149
HORIZON TRADER	KIRH	Oakland	34	0	0	0	0	0	0	0	0	0	0	0	34
INDEPENDENCE	WRYG	Baltimore	0	84	0	0	0	0	0	0	0	0	0	0	84
INDEPENDENT VENTURE	A8CG2	Baltimore	28	33	0	0	0	0	0	0	0	0	0	0	61

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
INDIAN OCEAN	C6T2063	New York City	29	22	0	0	0	0	0	0	0	0	0	0	51
INDOTRANS CELEBES	VRZN9	Norfolk	45	13	0	0	0	0	0	0	0	0	0	0	58
INLET RESEARCH	KEC43	Anchorage	1	1	0	0	0	0	0	0	0	0	0	0	2
INSPIRATION	C6FM5	Anchorage	3	5	0	0	0	0	0	0	0	0	0	0	8
ISLAND PRINCESS	ZCDG4	Anchorage	7	47	0	0	0	0	0	0	0	0	0	0	54
ITB BALTIMORE	WXKM	Baltimore	0	10	0	0	0	0	0	0	0	0	0	0	10
ITB GROTON	KMJL	New York City	12	42	0	0	0	0	0	0	0	0	0	0	54
ITB JACKSONVILLE	WNDG	Baltimore	12	0	0	0	0	0	0	0	0	0	0	0	12
ITB NEW YORK	WVDG	Baltimore	2	5	0	0	0	0	0	0	0	0	0	0	7
JAG PRAKASH	AUBK	Anchorage	18	0	0	0	0	0	0	0	0	0	0	0	18
JAMES R. BARKER	WYP8657	Chicago	49	0	0	0	0	0	0	0	0	0	0	0	49
JAMES RIVER BRIDGE	H9LW	Anchorage	52	0	0	0	0	0	0	0	0	0	0	0	52
JENS MAERSK	OYYK2	New York City	64	43	0	0	0	0	0	0	0	0	0	0	107
JEPPESEN MAERSK	OWTW2	New York City	12	25	0	0	0	0	0	0	0	0	0	0	37
JERVIS BAY	MQPF2	Anchorage	26	38	0	0	0	0	0	0	0	0	0	0	64
JOHANNES MAERSK	OWFD2	Miami	13	1	0	0	0	0	0	0	0	0	0	0	14
JOHN BRIX	WCY7560	Kodiak	0	1	0	0	0	0	0	0	0	0	0	0	1
JOHN G. MUNSON	WE3806	Chicago	1	0	0	0	0	0	0	0	0	0	0	0	1
JOIDES RESOLUTION	D5BC	Norfolk	1	0	0	0	0	0	0	0	0	0	0	0	1
JOSEPH L. BLOCK	WDA2768	Chicago	4	0	0	0	0	0	0	0	0	0	0	0	4
JUDY LITRICO	KCKB	New Orleans	42	62	0	0	0	0	0	0	0	0	0	0	104
JUSTINE FOSS	WYL4978	Kodiak	0	19	0	0	0	0	0	0	0	0	0	0	19
KAUAI	WSRH	Long Beach	40	17	0	0	0	0	0	0	0	0	0	0	57
KAYE E. BARKER	WCF3012	Chicago	11	0	0	0	0	0	0	0	0	0	0	0	11
KEISHO	3FYN4	Seattle	18	0	0	0	0	0	0	0	0	0	0	0	18
KENAI	WSNB	Valdez	9	4	0	0	0	0	0	0	0	0	0	0	13
KILO MOANA	WDA7827	Honolulu	3	10	0	0	0	0	0	0	0	0	0	0	13
KOTA PERTAMA	DGVS	New York City	38	24	0	0	0	0	0	0	0	0	0	0	62
LEE A. TREGURTHA	WUR8857	Chicago	27	0	0	0	0	0	0	0	0	0	0	0	27
LEGEND OF THE SEAS	C6SL5	Miami	47	49	0	0	0	0	0	0	0	0	0	0	96
LEYLA KALKAVAN	TCCJ7	Norfolk	0	47	0	0	0	0	0	0	0	0	0	0	47
LIBERTY	WRYX	Baltimore	49	37	0	0	0	0	0	0	0	0	0	0	86
LIBERTY EAGLE	WHIA	Houston	15	44	0	0	0	0	0	0	0	0	0	0	59
LIBERTY GLORY	WADP	New Orleans	42	16	0	0	0	0	0	0	0	0	0	0	58
LIBERTY GRACE	WADN	New Orleans	35	39	0	0	0	0	0	0	0	0	0	0	74
LIBERTY SPIRIT	WCPU	New Orleans	30	0	0	0	0	0	0	0	0	0	0	0	30
LIBERTY STAR	WCBP	New Orleans	43	22	0	0	0	0	0	0	0	0	0	0	65
LIBERTY SUN	WCOB	New Orleans	18	26	0	0	0	0	0	0	0	0	0	0	44
LIHUE	WTST	Oakland	25	38	0	0	0	0	0	0	0	0	0	0	63
LINDA OLDENDORFF	ELRR2	Baltimore	56	40	0	0	0	0	0	0	0	0	0	0	96
LINDEN PRIDE	H3VP	Houston	1	0	0	0	0	0	0	0	0	0	0	0	1
LIONS GATE BRIDGE	H9LV	Anchorage	0	30	0	0	0	0	0	0	0	0	0	0	30
LNG ARIES	V7BW7	New York City	35	30	0	0	0	0	0	0	0	0	0	0	65
LNG CAPRICORN	V7BW8	New York City	29	40	0	0	0	0	0	0	0	0	0	0	69
LNG GEMINI	V7BW9	Kodiak	19	20	0	0	0	0	0	0	0	0	0	0	39
LNG LEO	V7BX2	New York City	13	0	0	0	0	0	0	0	0	0	0	0	13
LNG TAURUS	V7BX4	New York City	36	51	0	0	0	0	0	0	0	0	0	0	87
LNG VIRGO	V7BX5	New York City	4	40	0	0	0	0	0	0	0	0	0	0	44
LT UNITY	3FCD9	Seattle	1	1	0	0	0	0	0	0	0	0	0	0	2
LTC CALVIN P. TITUS	KJLV	Jacksonville	22	19	0	0	0	0	0	0	0	0	0	0	41
LURLINE	WLVD	Oakland	34	30	0	0	0	0	0	0	0	0	0	0	64
LYKES DISCOVERER	WGXO	Houston	83	66	0	0	0	0	0	0	0	0	0	0	149

VOS Cooperative Ship Report

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
LYKES EAGLE	VSUA7	Anchorage	17	18	0	0	0	0	0	0	0	0	0	0	35
LYKES EXPLORER	WGLA	Houston	37	59	0	0	0	0	0	0	0	0	0	0	96
LYKES HERO	ZCBN5	Anchorage	33	30	0	0	0	0	0	0	0	0	0	0	63
LYKES LIBERATOR	WGXN	Houston	75	212	0	0	0	0	0	0	0	0	0	0	287
LYKES MOTIVATOR	WABU	Houston	53	42	0	0	0	0	0	0	0	0	0	0	95
LYKES NAVIGATOR	WGMJ	Houston	6	85	0	0	0	0	0	0	0	0	0	0	91
LYKES RANGER	ZIYE7	Houston	22	19	0	0	0	0	0	0	0	0	0	0	41
M/V ASPHALT COMMANDER	WFJN	New Orleans	33	5	0	0	0	0	0	0	0	0	0	0	38
M/V FREEDOM	WDB5483	Baltimore	46	43	0	0	0	0	0	0	0	0	0	0	89
M/V GSF EXPLORER	WCX5333	New Orleans	52	25	0	0	0	0	0	0	0	0	0	0	77
M/V PATRIOT	WQVY	Baltimore	0	39	0	0	0	0	0	0	0	0	0	0	39
M/V RESOLVE	WCZ5535	Baltimore	5	27	0	0	0	0	0	0	0	0	0	0	32
MAASDAM	PFRO	Miami	21	43	0	0	0	0	0	0	0	0	0	0	64
MACKINAC BRIDGE	JKES	New York City	38	52	0	0	0	0	0	0	0	0	0	0	90
MADISON MAERSK	OVJB2	Oakland	20	6	0	0	0	0	0	0	0	0	0	0	26
MAERSK ARIZONA	KAKG	Baltimore	6	0	0	0	0	0	0	0	0	0	0	0	6
MAERSK CAROLINA	WBDS	Charleston	13	35	0	0	0	0	0	0	0	0	0	0	48
MAERSK CONSTELLATION	WRYJ	Houston	35	10	0	0	0	0	0	0	0	0	0	0	45
MAERSK DUBLIN	V2OE1	New York City	3	0	0	0	0	0	0	0	0	0	0	0	3
MAERSK GEORGIA	WAHP	New York City	0	7	0	0	0	0	0	0	0	0	0	0	7
MAERSK MISSOURI	WAHV	Norfolk	3	39	0	0	0	0	0	0	0	0	0	0	42
MAERSK NANTES	V2OO7	New York City	41	44	0	0	0	0	0	0	0	0	0	0	85
MAERSK NEWARK	A8CF2	New York City	32	31	0	0	0	0	0	0	0	0	0	0	63
MAERSK PECEM	V2OU9	Charleston	0	10	0	0	0	0	0	0	0	0	0	0	10
MAERSK TAIKI	9VIG	Baltimore	5	22	0	0	0	0	0	0	0	0	0	0	27
MAERSK TAIYO	9VJO	Jacksonville	6	0	0	0	0	0	0	0	0	0	0	0	6
MAERSK TOLEDO	MZOJ8	Seattle	0	5	0	0	0	0	0	0	0	0	0	0	5
MAERSK VALENCIA	DAPG	New York City	68	60	0	0	0	0	0	0	0	0	0	0	128
MAERSK WIND	S6TY	Baltimore	61	71	0	0	0	0	0	0	0	0	0	0	132
MAGLEBY MAERSK	OUSH2	New York City	48	37	0	0	0	0	0	0	0	0	0	0	85
MAHARASHTRA	VTSQ	Seattle	18	6	0	0	0	0	0	0	0	0	0	0	24
MAHIMAHI	WHRN	Oakland	36	29	0	0	0	0	0	0	0	0	0	0	65
MAIA H.	WYX2079	Kodiak	8	1	0	0	0	0	0	0	0	0	0	0	9
MAJESTIC MAERSK	OUJH2	New York City	34	20	0	0	0	0	0	0	0	0	0	0	54
MANOA	KDBG	Oakland	25	54	0	0	0	0	0	0	0	0	0	0	79
MANUKAI	WRGD	New York City	35	37	0	0	0	0	0	0	0	0	0	0	72
MARCY J	WCF4791	Kodiak	0	23	0	0	0	0	0	0	0	0	0	0	23
MAREN MAERSK	OWZU2	Long Beach	34	27	0	0	0	0	0	0	0	0	0	0	61
MARGRETHE MAERSK	OYSN2	Long Beach	16	32	0	0	0	0	0	0	0	0	0	0	48
MARIE MAERSK	OULL2	New York City	54	0	0	0	0	0	0	0	0	0	0	0	54
MARIELLE BOLTEN	ELZH9	New York City	2	0	0	0	0	0	0	0	0	0	0	0	2
MARTORELL	HPNE	New York City	55	60	0	0	0	0	0	0	0	0	0	0	115
MATANUSKA	WN4201	Kodiak	4	0	0	0	0	0	0	0	0	0	0	0	4
MATHILDE MAERSK	OUUU2	Long Beach	9	29	0	0	0	0	0	0	0	0	0	0	38
MATSONIA	KHRC	Oakland	30	56	0	0	0	0	0	0	0	0	0	0	86
MAUI	WSLH	Long Beach	17	27	0	0	0	0	0	0	0	0	0	0	44
MAUNAWILI	WDB7104	New York City	39	48	0	0	0	0	0	0	0	0	0	0	87
MAURICE EWING	WLDZ	New York City	15	0	0	0	0	0	0	0	0	0	0	0	15
MAYVIEW MAERSK	OWEB2	Oakland	47	23	0	0	0	0	0	0	0	0	0	0	70
MC-KINNEY MAERSK	OUZW2	New York City	19	16	0	0	0	0	0	0	0	0	0	0	35
MCKEE SONS	WCZ9703	Chicago	12	0	0	0	0	0	0	0	0	0	0	0	12

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
MEKONG PIONEER	V2JN	Miami	25	35	0	0	0	0	0	0	0	0	0	0	60
MELVILLE	WECB	Long Beach	25	76	0	0	0	0	0	0	0	0	0	0	101
MERCURY	C6SQ6	Miami	8	7	0	0	0	0	0	0	0	0	0	0	15
MESABI MINER	WYQ4356	Chicago	56	0	0	0	0	0	0	0	0	0	0	0	56
METTE MAERSK	OXKT2	Long Beach	0	4	0	0	0	0	0	0	0	0	0	0	4
MIDNIGHT SUN	WAHG	Seattle	56	83	0	0	0	0	0	0	0	0	0	0	139
MIKI HANA	WTW9252	Kodiak	2	2	0	0	0	0	0	0	0	0	0	0	4
MOKIHANA	WNRD	Oakland	50	72	0	0	0	0	0	0	0	0	0	0	122
MOKU PAHU	WBWK	Oakland	14	26	0	0	0	0	0	0	0	0	0	0	40
MOL CALLAO	MXMM5	Anchorage	86	59	0	0	0	0	0	0	0	0	0	0	145
MOL COMMITMENT	9VID2	Charleston	32	36	0	0	0	0	0	0	0	0	0	0	68
MOL EFFICIENCY	HOZY	Anchorage	48	28	0	0	0	0	0	0	0	0	0	0	76
MOL EXCELLENCE	HPEF	Anchorage	50	34	0	0	0	0	0	0	0	0	0	0	84
MOL INNOVATION	9VVP	Oakland	18	22	0	0	0	0	0	0	0	0	0	0	40
MOL OASIS	3ENO4	Anchorage	10	7	0	0	0	0	0	0	0	0	0	0	17
MOL VIGOR	9VVN	Oakland	33	26	0	0	0	0	0	0	0	0	0	0	59
MOL WELLINGTON	H9TO	Anchorage	55	41	0	0	0	0	0	0	0	0	0	0	96
MSC DONATA	A8EU2	Anchorage	26	34	0	0	0	0	0	0	0	0	0	0	60
MSC FEDERICA	C4LV	New York City	8	0	0	0	0	0	0	0	0	0	0	0	8
MSC JESSICA	H3YF	New York City	1	0	0	0	0	0	0	0	0	0	0	0	1
MSC MATILDE	HODP	New York City	34	29	0	0	0	0	0	0	0	0	0	0	63
MSC SPAIN	DNKL	Norfolk	27	42	0	0	0	0	0	0	0	0	0	0	69
MV MONTAUK	WDCJ	New Orleans	37	26	0	0	0	0	0	0	0	0	0	0	63
NATOMA	WBB5799	Kodiak	0	1	0	0	0	0	0	0	0	0	0	0	1
NAVAJO	WCT5737	Kodiak	15	11	0	0	0	0	0	0	0	0	0	0	26
NAVIGATOR	WBO3345	Anchorage	2	0	0	0	0	0	0	0	0	0	0	0	2
NAVIGATOR OF THE SEAS	C6FU4	Miami	12	23	0	0	0	0	0	0	0	0	0	0	35
NEW HORIZON	WKWB	Long Beach	6	37	0	0	0	0	0	0	0	0	0	0	43
NOAA DAVID STARR JORDAN	WTDK	Long Beach	53	131	0	0	0	0	0	0	0	0	0	0	184
NOAA SHIP ALBATROSS IV	WMVF	Norfolk	45	100	0	0	0	0	0	0	0	0	0	0	145
NOAA SHIP DELAWARE II	KNBD	New York City	5	79	0	0	0	0	0	0	0	0	0	0	84
NOAA SHIP GORDON GUNTER	WTEO	New Orleans	69	87	0	0	0	0	0	0	0	0	0	0	156
NOAA SHIP HI' IALAKAI	WTEY	Seattle	0	15	0	0	0	0	0	0	0	0	0	0	15
NOAA SHIP KA'IMIMOANA	WTEU	Honolulu	0	29	0	0	0	0	0	0	0	0	0	0	29
NOAA SHIP MILLER FREEMAN	WTDM	Seattle	0	52	0	0	0	0	0	0	0	0	0	0	52
NOAA SHIP NANCY FOSTER	WTER	Norfolk	10	65	0	0	0	0	0	0	0	0	0	0	75
NOAA SHIP OREGON II	WTDO	New Orleans	43	87	0	0	0	0	0	0	0	0	0	0	130
NOAA SHIP OSCAR ELTON SETTE	WTEE	Jacksonville	32	44	0	0	0	0	0	0	0	0	0	0	76
NOAA SHIP RONALD H BROWN	WTEC	New Orleans	57	70	0	0	0	0	0	0	0	0	0	0	127
NORASIA ATLAS	A8FR9	New York City	6	57	0	0	0	0	0	0	0	0	0	0	63
NORDEAGLE	P3KE8	New York City	0	9	0	0	0	0	0	0	0	0	0	0	9
NORTH STAR	KIYI	Seattle	53	59	0	0	0	0	0	0	0	0	0	0	112
NORTHERN VICTOR	WCZ6534	Kodiak	4	3	0	0	0	0	0	0	0	0	0	0	7
NORWEGIAN DREAM	C6LG5	New Orleans	9	12	0	0	0	0	0	0	0	0	0	0	21
NORWEGIAN SEA	C6DM2	Houston	10	12	0	0	0	0	0	0	0	0	0	0	22
NOVA TERRA	C6IZ7	Miami	27	32	0	0	0	0	0	0	0	0	0	0	59

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
OCEAN PREFACE	VRUL7	New Orleans	15	10	0	0	0	0	0	0	0	0	0	0	25
OCEAN RELIANCE	WADY	Kodiak	16	21	0	0	0	0	0	0	0	0	0	0	37
OCEAN SERVICE	WTW9263	Kodiak	0	1	0	0	0	0	0	0	0	0	0	0	1
OCEAN TITAN	WDB9647	Anchorage	0	13	0	0	0	0	0	0	0	0	0	0	13
OCEAN VICTORY	V7EB8	Kodiak	2	0	0	0	0	0	0	0	0	0	0	0	2
OLEANDER	PJJU	New York City	12	1	0	0	0	0	0	0	0	0	0	0	13
OLGA MAERSK	OXBB2	New York City	14	19	0	0	0	0	0	0	0	0	0	0	33
OLIVIA MAERSK	OXKO2	Miami	29	6	0	0	0	0	0	0	0	0	0	0	35
OLUF MAERSK	OXFU2	New York City	21	37	0	0	0	0	0	0	0	0	0	0	58
OOCL AMERICA	VRWE8	Seattle	10	15	0	0	0	0	0	0	0	0	0	0	25
OOCL CALIFORNIA	VRWC8	Seattle	54	30	0	0	0	0	0	0	0	0	0	0	84
OOCL CHICAGO	VRWQ2	Anchorage	35	40	0	0	0	0	0	0	0	0	0	0	75
OOCL CHINA	VRWE7	Anchorage	55	71	0	0	0	0	0	0	0	0	0	0	126
OOCL FAIR	VRWB8	Long Beach	25	7	0	0	0	0	0	0	0	0	0	0	32
OOCL FAITH	VRWG6	New York City	55	46	0	0	0	0	0	0	0	0	0	0	101
OOCL FIDELITY	VRWG5	Long Beach	12	6	0	0	0	0	0	0	0	0	0	0	18
OOCL FORTUNE	VRWF2	Norfolk	44	29	0	0	0	0	0	0	0	0	0	0	73
OOCL HAMBURG	VRZK9	Anchorage	0	21	0	0	0	0	0	0	0	0	0	0	21
OOCL HONG KONG	VRVA5	Oakland	6	24	0	0	0	0	0	0	0	0	0	0	30
OOCL JAPAN	VRWB7	Anchorage	23	9	0	0	0	0	0	0	0	0	0	0	32
OOCL KOREA	DMRG	Anchorage	24	11	0	0	0	0	0	0	0	0	0	0	35
OOCL NETHERLANDS	VRVN6	Long Beach	0	7	0	0	0	0	0	0	0	0	0	0	7
OOCL NEW YORK	DPAK	Anchorage	67	69	0	0	0	0	0	0	0	0	0	0	136
OOCL NINGBO	VRZL3	Anchorage	48	44	0	0	0	0	0	0	0	0	0	0	92
OOCL ROTTERDAM	VRZK8	Anchorage	7	40	0	0	0	0	0	0	0	0	0	0	47
OOCL SHANGHAI	ELXT8	Anchorage	25	44	0	0	0	0	0	0	0	0	0	0	69
OOSTERDAM	PBKH	Anchorage	3	2	0	0	0	0	0	0	0	0	0	0	5
ORIANA	GVSN	Miami	10	8	0	0	0	0	0	0	0	0	0	0	18
ORIENTE SHINE	H9AL	Seattle	30	20	0	0	0	0	0	0	0	0	0	0	50
ORIENTE VICTORIA	3FVG8	Seattle	42	40	0	0	0	0	0	0	0	0	0	0	82
OTELLO	SCFH	New York City	0	23	0	0	0	0	0	0	0	0	0	0	23
OURO DO BRASIL	ELPP9	Baltimore	22	17	0	0	0	0	0	0	0	0	0	0	39
OVERSEAS CHICAGO	KBCF	Valdez	4	26	0	0	0	0	0	0	0	0	0	0	30
OVERSEAS HARRIETTE	WRFJ	Houston	1	0	0	0	0	0	0	0	0	0	0	0	1
OVERSEAS JOYCE	WUQL	Jacksonville	28	19	0	0	0	0	0	0	0	0	0	0	47
OVERSEAS NEW ORLEANS	WFKW	Houston	41	31	0	0	0	0	0	0	0	0	0	0	72
OVERSEAS NEW YORK	WMCK	Valdez	22	22	0	0	0	0	0	0	0	0	0	0	44
OVERSEAS WASHINGTON	WFGV	Valdez	20	20	0	0	0	0	0	0	0	0	0	0	40
P & O NEDLLOYD ALGOA	DBUZ	Anchorage	0	32	0	0	0	0	0	0	0	0	0	0	32
P & O NEDLLOYD ANDES	ELYY5	Anchorage	0	10	0	0	0	0	0	0	0	0	0	0	10
P & O NEDLLOYD KOBE	MYJM3	Anchorage	0	20	0	0	0	0	0	0	0	0	0	0	20
P & O NEDLLOYD VESPUCCI	DBUT	Anchorage	0	14	0	0	0	0	0	0	0	0	0	0	14
P&O NEDLLOYD VERA CRUZ	WDC2886	Houston	0	34	0	0	0	0	0	0	0	0	0	0	34
PACIFIC AVENGER	WCY8175	Kodiak	1	31	0	0	0	0	0	0	0	0	0	0	32
PACIFIC CHALLENGER	WDA3588	Kodiak	3	24	287	0	0	0	0	0	0	0	0	0	311
PACIFIC PATRIOT	WDB6493	Kodiak	40	0	0	0	0	0	0	0	0	0	0	0	40
PACIFIC PRINCESS	ZDDY7	Anchorage	1	0	0	0	0	0	0	0	0	0	0	0	1
PACIFIC RAVEN	WDB7583	Kodiak	67	33	0	0	0	0	0	0	0	0	0	0	100
PACIFIC STAR	WCW7740	Kodiak	0	1	0	0	0	0	0	0	0	0	0	0	1
PARAGON	WDA2311	Kodiak	41	9	0	0	0	0	0	0	0	0	0	0	50

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
PATHFINDER	WBN8467	Valdez	5	0	0	0	0	0	0	0	0	0	0	0	5
PATRIOT	NL9WX	Kodiak	36	10	0	0	0	0	0	0	0	0	0	0	46
PAUL R. TREGURTHA	WYR4481	Chicago	33	0	0	0	0	0	0	0	0	0	0	0	33
PENANG SENATOR	DQVH	Seattle	21	65	0	0	0	0	0	0	0	0	0	0	86
PERSEVERANCE	WSKH	Houston	4	0	0	0	0	0	0	0	0	0	0	0	4
PHOENIX VOYAGER	C6QE3	Oakland	19	5	0	0	0	0	0	0	0	0	0	0	24
PHYLLIS DUNLAP	WDA6552	Kodiak	0	20	0	0	0	0	0	0	0	0	0	0	20
PITTSBURG	ELTQ6	Baltimore	56	55	0	0	0	0	0	0	0	0	0	0	111
POLAR ADVENTURE	WAZV	New Orleans	30	18	0	0	0	0	0	0	0	0	0	0	48
POLAR ALASKA	KSBK	Valdez	48	37	0	0	0	0	0	0	0	0	0	0	85
POLAR CALIFORNIA	WMCV	Long Beach	21	17	0	0	0	0	0	0	0	0	0	0	38
POLAR DISCOVERY	WACW	New Orleans	23	11	0	0	0	0	0	0	0	0	0	0	34
POLAR EAGLE	ELPT3	Anchorage	45	168	0	0	0	0	0	0	0	0	0	0	213
POLAR ENDEAVOUR	WCAJ	New Orleans	10	9	0	0	0	0	0	0	0	0	0	0	19
POLAR RESOLUTION	WDJK	New Orleans	36	44	0	0	0	0	0	0	0	0	0	0	80
POTOMAC BRIDGE	A8CI9	Anchorage	50	50	0	0	0	0	0	0	0	0	0	0	100
PREMIUM DO BRASIL	A8BL4	Baltimore	7	19	0	0	0	0	0	0	0	0	0	0	26
PRESIDENT ADAMS	WRYW	Seattle	67	65	0	0	0	0	0	0	0	0	0	0	132
PRESIDENT GRANT	WCY2098	Long Beach	43	53	0	0	0	0	0	0	0	0	0	0	96
PRESIDENT JACKSON	WRYC	Seattle	36	38	0	0	0	0	0	0	0	0	0	0	74
PRESIDENT POLK	WRYD	Seattle	71	52	0	0	0	0	0	0	0	0	0	0	123
PRESIDENT TRUMAN	WNDP	Seattle	31	52	0	0	0	0	0	0	0	0	0	0	83
PRESIDENT WILSON	WCY3438	Long Beach	41	42	0	0	0	0	0	0	0	0	0	0	83
PRESQUE ISLE	WZE4928	Chicago	19	0	0	0	0	0	0	0	0	0	0	0	19
PRINCE WILLIAM SOUND	WSDX	Valdez	12	13	0	0	0	0	0	0	0	0	0	0	25
PURITAN	ZCDH9	Miami	45	48	0	0	0	0	0	0	0	0	0	0	93
PUSAN SENATOR	DQVG	Seattle	23	14	0	0	0	0	0	0	0	0	0	0	37
R.J. PFEIFFER	WRJP	Long Beach	1	8	0	0	0	0	0	0	0	0	0	0	9
RAINBOW WING	3FIQ7	Anchorage	14	30	0	0	0	0	0	0	0	0	0	0	44
REDFIN	WTP2735	Kodiak	0	1	0	0	0	0	0	0	0	0	0	0	1
REGAL PRINCESS	ZCBU4	Anchorage	0	3	0	0	0	0	0	0	0	0	0	0	3
REGULUS VOYAGER	C6FE6	Oakland	47	40	0	0	0	0	0	0	0	0	0	0	87
RHINE FOREST	V7EI9	New Orleans	26	24	0	0	0	0	0	0	0	0	0	0	50
RICHARD H MATZKE	C6FE5	Oakland	30	8	0	0	0	0	0	0	0	0	0	0	38
RICKMERS HAMBERG	V7DS3	New Orleans	16	4	0	0	0	0	0	0	0	0	0	0	20
RIO GALLEGOS I	HODT	Seattle	5	3	0	0	0	0	0	0	0	0	0	0	8
ROBERT C. SEAMENS	WDA4486	Kodiak	1	11	0	0	0	0	0	0	0	0	0	0	12
ROGER BLOUGH	WZP8164	Chicago	9	0	0	0	0	0	0	0	0	0	0	0	9
ROGER REVELLE	KAOU	New Orleans	65	52	0	0	0	0	0	0	0	0	0	0	117
ROTTERDAM	PDGS	Anchorage	21	73	0	0	0	0	0	0	0	0	0	0	94
ROUGHNECK	WTW9262	Kodiak	2	0	0	0	0	0	0	0	0	0	0	0	2
RUBIN ARTEMIS	3FAH7	Seattle	4	19	0	0	0	0	0	0	0	0	0	0	23
RUBIN PEARL	YJQA8	Seattle	49	14	0	0	0	0	0	0	0	0	0	0	63
RUFF & REDDY	WY4096	Kodiak	1	0	0	0	0	0	0	0	0	0	0	0	1
RYNDAM	PHFV	Miami	4	2	0	0	0	0	0	0	0	0	0	0	6
S/R WILMINGTON	WBVZ	Houston	0	1	0	0	0	0	0	0	0	0	0	0	1
SAFMARINE ZAMBEZI	A8CE9	New York City	55	30	0	0	0	0	0	0	0	0	0	0	85
SALLY MAERSK	OZHS2	Seattle	45	3	0	0	0	0	0	0	0	0	0	0	48
SAMSON MARINER	WCN3586	Kodiak	10	5	0	0	0	0	0	0	0	0	0	0	15
SANTA BARBARA	ELOT3	Seattle	26	15	0	0	0	0	0	0	0	0	0	0	41
SAPPHIRE PRINCESS	ZCDG7	Anchorage	52	50	0	0	0	0	0	0	0	0	0	0	102
SAUDI ABHA	HZRX	Baltimore	7	51	0	0	0	0	0	0	0	0	0	0	58

VOS Cooperative Ship Report

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
SAUDI DIRIYAH	HZZB	Houston	18	3	0	0	0	0	0	0	0	0	0	0	21
SAUDI HOFUF	HZZC	Houston	10	12	0	0	0	0	0	0	0	0	0	0	22
SAUDI TABUK	HZZD	Houston	68	27	0	0	0	0	0	0	0	0	0	0	95
SCHACKENBORG	ZCIH7	Houston	7	28	0	0	0	0	0	0	0	0	0	0	35
SEA PRINCE	WYT8569	Anchorage	20	74	0	0	0	0	0	0	0	0	0	0	94
SEA RELIANCE	WEOB	Kodiak	8	3	0	0	0	0	0	0	0	0	0	0	11
SEA VOYAGER	WCX9106	Valdez	40	43	0	0	0	0	0	0	0	0	0	0	83
SEA-LAND DEFENDER	KGJB	Oakland	82	51	0	0	0	0	0	0	0	0	0	0	133
SEA-LAND PATRIOT	KHRF	Oakland	54	77	0	0	0	0	0	0	0	0	0	0	131
SEABULK ARCTIC	WCY7054	Kodiak	25	17	0	0	0	0	0	0	0	0	0	0	42
SEABULK MONTANA	WCW9126	Anchorage	23	99	0	0	0	0	0	0	0	0	0	0	122
SEABULK PRIDE	WCY7052	Kodiak	16	25	0	0	0	0	0	0	0	0	0	0	41
SEABULK TRADER	KNJK	Miami	22	38	0	0	0	0	0	0	0	0	0	0	60
SEALAND ACHIEVER	WPKD	Houston	55	65	0	0	0	0	0	0	0	0	0	0	120
SEALAND ATLANTIC	KRLZ	Houston	48	38	0	0	0	0	0	0	0	0	0	0	86
SEALAND CHAMPION	MCDZ2	Oakland	22	17	0	0	0	0	0	0	0	0	0	0	39
SEALAND COMET	WDB9950	Norfolk	39	65	0	0	0	0	0	0	0	0	0	0	104
SEALAND COMMITMENT	KRPB	Houston	46	61	0	0	0	0	0	0	0	0	0	0	107
SEALAND DEVELOPER	KHRH	Houston	33	1	0	0	0	0	0	0	0	0	0	0	34
SEALAND EXPRESS	KGJD	Long Beach	68	415	0	0	0	0	0	0	0	0	0	0	483
SEALAND FLORIDA	KRHX	Houston	50	51	0	0	0	0	0	0	0	0	0	0	101
SEALAND FREEDOM	V7AM3	Norfolk	1	39	0	0	0	0	0	0	0	0	0	0	40
SEALAND INDEPENDENCE	WGJC	Long Beach	23	27	0	0	0	0	0	0	0	0	0	0	50
SEALAND INNOVATOR	WGKF	Oakland	40	50	0	0	0	0	0	0	0	0	0	0	90
SEALAND INTEGRITY	WPVD	Houston	92	283	0	0	0	0	0	0	0	0	0	0	375
SEALAND INTREPID	WDB9949	Charleston	25	11	0	0	0	0	0	0	0	0	0	0	36
SEALAND LIBERATOR	KHRP	Oakland	52	26	0	0	0	0	0	0	0	0	0	0	78
SEALAND MARINER	V7AM5	New York City	23	37	0	0	0	0	0	0	0	0	0	0	60
SEALAND MERCURY	MCDW9	Oakland	71	67	0	0	0	0	0	0	0	0	0	0	138
SEALAND METEOR	WDB9951	Miami	15	22	0	0	0	0	0	0	0	0	0	0	37
SEALAND MOTIVATOR	WAAH	Houston	47	64	0	0	0	0	0	0	0	0	0	0	111
SEALAND PERFORMANCE	KRPD	Houston	18	31	0	0	0	0	0	0	0	0	0	0	49
SEALAND PRIDE	WDB9444	Houston	97	83	0	0	0	0	0	0	0	0	0	0	180
SEALAND QUALITY	KRNJ	Houston	12	29	0	0	0	0	0	0	0	0	0	0	41
SEALAND RACER	MCDW2	Charleston	23	23	0	0	0	0	0	0	0	0	0	0	46
SEALAND VOYAGER	KHRK	Long Beach	33	56	0	0	0	0	0	0	0	0	0	0	89
SEARIVER BAYTOWN	KFPM	Valdez	0	28	0	0	0	0	0	0	0	0	0	0	28
SEARIVER COLUMBIA BAY	WFQE	Long Beach	9	0	0	0	0	0	0	0	0	0	0	0	9
SEARIVER LONG BEACH	WHCA	Long Beach	1	3	0	0	0	0	0	0	0	0	0	0	4
SELMA KALKAVAN	V7GX5	Norfolk	23	55	0	0	0	0	0	0	0	0	0	0	55
SENSATION	C6FM8	Miami	27	18	0	0	0	0	0	0	0	0	0	0	78
SIDNEY FOSS	WYL5445	Kodiak	35	31	0	0	0	0	0	0	0	0	0	0	66
SINE MAERSK	OZOK2	Seattle	0	0	0	0	0	0	0	0	0	0	0	0	0
SKANDERBORG	ZCIG4	Houston	23	0	0	0	0	0	0	0	0	0	0	0	23
SKAUGRAN	LADB2	Seattle	8	29	0	0	0	0	0	0	0	0	0	0	37
SKODSBORG	ZCIJ7	Baltimore	26	5	0	0	0	0	0	0	0	0	0	0	31
SKY PRINCESS	GYYP	Anchorage	9	202	0	0	0	0	0	0	0	0	0	0	211
SNOW DRIFT	ZCGL3	Anchorage	62	50	0	0	0	0	0	0	0	0	0	0	112
SOFIE MAERSK	OZUN2	Seattle	0	52	0	0	0	0	0	0	0	0	0	0	52
SOL DO BRASIL	ELQQ4	Baltimore	0	4	0	0	0	0	0	0	0	0	0	0	4
SOLAR WING	ELJS7	Jacksonville	94	87	0	0	0	0	0	0	0	0	0	0	181
SOROE MAERSK	OYKJ2	Seattle	33	0	0	0	0	0	0	0	0	0	0	0	33

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
SOUND RELIANCE	WXAE	Kodiak	6	140	0	0	0	0	0	0	0	0	0	0	146
SOUTHDOWN CHALLENGER	WDB9135	Chicago	3	0	0	0	0	0	0	0	0	0	0	0	3
ST PAUL RESEARCH	KEY796	Anchorage	0	3	0	0	0	0	0	0	0	0	0	0	3
STAR ALABAMA	LAVU4	Baltimore	42	61	0	0	0	0	0	0	0	0	0	0	103
STAR AMERICA	LAVV4	Jacksonville	10	24	0	0	0	0	0	0	0	0	0	0	34
STAR DOVER	LAEP4	Seattle	0	25	0	0	0	0	0	0	0	0	0	0	25
STAR EAGLE	LAWO2	Baltimore	31	24	0	0	0	0	0	0	0	0	0	0	55
STAR EVVIVA	LAHE2	Jacksonville	20	30	0	0	0	0	0	0	0	0	0	0	50
STAR GEIRANGER	LAKQ5	Seattle	0	34	0	0	0	0	0	0	0	0	0	0	34
STAR GRAN	LADR4	Long Beach	0	19	0	0	0	0	0	0	0	0	0	0	19
STAR GRINDANGER	LAKR5	Norfolk	20	0	0	0	0	0	0	0	0	0	0	0	20
STAR HARMONIA	LAGB5	Baltimore	35	50	0	0	0	0	0	0	0	0	0	0	85
STAR HERDLA	LAVD4	Baltimore	6	0	0	0	0	0	0	0	0	0	0	0	6
STAR HIDRA	LAVN4	Baltimore	13	0	0	0	0	0	0	0	0	0	0	0	13
STAR INDIANA	S6BE	Baltimore	33	18	0	0	0	0	0	0	0	0	0	0	51
STAR ISMENE	LANT5	Baltimore	32	28	0	0	0	0	0	0	0	0	0	0	60
STAR JAPAN	LAZV5	Baltimore	1	54	0	0	0	0	0	0	0	0	0	0	55
STAR PRINCESS	ZCDD6	Anchorage	9	0	0	0	0	0	0	0	0	0	0	0	9
STATENDAM	PHSG	Miami	23	42	0	0	0	0	0	0	0	0	0	0	65
STELLAR VOYAGER	C6FV4	Seattle	3	3	0	0	0	0	0	0	0	0	0	0	6
STEWART J. CORT	WDB4570	Chicago	5	0	0	0	0	0	0	0	0	0	0	0	5
STIMSON	KF002	Kodiak	33	14	0	0	0	0	0	0	0	0	0	0	47
STRONG PATRIOT	WCZ8589	Norfolk	1	11	0	0	0	0	0	0	0	0	0	0	12
SUN PRINCESS	ZCBU6	Anchorage	9	44	0	0	0	0	0	0	0	0	0	0	53
SUSAN MAERSK	OYIK2	Seattle	47	0	0	0	0	0	0	0	0	0	0	0	47
SVEND MAERSK	OYJS2	Seattle	27	20	0	0	0	0	0	0	0	0	0	0	47
SWIFT ARROW	C6NI7	Anchorage	12	46	0	0	0	0	0	0	0	0	0	0	58
T/V ENTERPRISE	KVMU	New York City	67	76	0	0	0	0	0	0	0	0	0	0	143
TAHITIAN PRINCESS	ZDDY8	Anchorage	26	20	0	0	0	0	0	0	0	0	0	0	46
TAIO FRONTIER	3EZF5	Anchorage	27	50	0	0	0	0	0	0	0	0	0	0	77
TALISMAN	LAOW5	Jacksonville	12	0	0	0	0	0	0	0	0	0	0	0	12
TAMESIS	LAOL5	Norfolk	0	10	0	0	0	0	0	0	0	0	0	0	10
TAMPA	LMWO3	Baltimore	33	19	0	0	0	0	0	0	0	0	0	0	52
TAN'ERLIQ	WCY8497	Valdez	0	2	0	0	0	0	0	0	0	0	0	0	2
TAUSALA SAMOA	V2FA2	Long Beach	27	25	0	0	0	0	0	0	0	0	0	0	52
TENACIOUS	WTK2123	Kodiak	1	0	0	0	0	0	0	0	0	0	0	0	1
TITAN	WAW9232	Kodiak	15	9	0	0	0	0	0	0	0	0	0	0	24
TMM JALISCO	ZCDJ7	Anchorage	4	0	0	0	0	0	0	0	0	0	0	0	4
TMM TABASCO	VSUA5	Anchorage	31	42	0	0	0	0	0	0	0	0	0	0	73
TONSINA	KJDG	Valdez	0	15	0	0	0	0	0	0	0	0	0	0	15
TREIN MAERSK	MSQQ8	Baltimore	23	22	0	0	0	0	0	0	0	0	0	0	45
TRIDENT	WCZ2913	Kodiak	0	1	0	0	0	0	0	0	0	0	0	0	1
TUSTUMENA	WNGW	Kodiak	99	90	0	0	0	0	0	0	0	0	0	0	189
TYCO DURABLE	V7DI8	Baltimore	0	54	0	0	0	0	0	0	0	0	0	0	54
TYCO RESPONDER	V7CY9	Baltimore	3	0	0	0	0	0	0	0	0	0	0	0	3
UBC SAIKI	P3GY9	Seattle	32	6	0	0	0	0	0	0	0	0	0	0	38
UBC SVEA	P3JA8	Seattle	21	30	0	0	0	0	0	0	0	0	0	0	51
UNITED SPIRIT	ELYB2	Seattle	39	73	0	0	0	0	0	0	0	0	0	0	112
USCGC ACUSHNET (WMEC 167)	NNHA	Kodiak	1	0	0	0	0	0	0	0	0	0	0	0	1
USCGC MACKINAW	NRKP	Chicago	5	0	0	0	0	0	0	0	0	0	0	0	5

VOS Cooperative Ship Report

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
USCGC POLAR STAR	NBTM	Seattle	42	143	0	0	0	0	0	0	0	0	0	0	185
USCGC SPAR	NJAR	Kodiak	1	13	0	0	0	0	0	0	0	0	0	0	14
VALENCIA BRIDGE	HOUU	Anchorage	46	56	0	0	0	0	0	0	0	0	0	0	102
VANCOUVER BRIDGE	H8FE	Seattle	0	5	0	0	0	0	0	0	0	0	0	0	5
VEENDAM	C6NL6	Miami	20	0	0	0	0	0	0	0	0	0	0	0	20
VIKING STAR	WAS4138	Kodiak	0	4	0	0	0	0	0	0	0	0	0	0	4
VIRGINIA BRIDGE	HOKP	Anchorage	30	28	0	0	0	0	0	0	0	0	0	0	58
VIRGINIAN	KSPH	Oakland	94	43	0	0	0	0	0	0	0	0	0	0	137
VIRGO VOYAGER	C6FG8	New Orleans	34	4	0	0	0	0	0	0	0	0	0	0	38
VLADIVOSTOK	UBXP	Seattle	39	32	0	0	0	0	0	0	0	0	0	0	71
VOLENDAM	PCHM	Anchorage	24	5	0	0	0	0	0	0	0	0	0	0	29
WASHINGTON VOYAGER	KFDB	Oakland	5	6	0	0	0	0	0	0	0	0	0	0	11
WECOMA	WSD7079	Seattle	74	37	0	0	0	0	0	0	0	0	0	0	111
WESTERDAM	PINX	Miami	2	19	0	0	0	0	0	0	0	0	0	0	21
WESTERN RANGER	WBN3008	Anchorage	2	6	0	0	0	0	0	0	0	0	0	0	8
WESTWARD VENTURE	KHJB	Seattle	0	23	0	0	0	0	0	0	0	0	0	0	23
WESTWOOD ANETTE	C6QO9	Seattle	7	5	0	0	0	0	0	0	0	0	0	0	12
WESTWOOD BREEZE	LAOT4	Seattle	43	10	0	0	0	0	0	0	0	0	0	0	53
WESTWOOD COLUMBIA	C6SI4	Seattle	19	35	0	0	0	0	0	0	0	0	0	0	54
WESTWOOD MARIANNE	C6QD3	Seattle	22	41	0	0	0	0	0	0	0	0	0	0	63
WESTWOOD OLYMPIA	C6UB2	Seattle	0	29	0	0	0	0	0	0	0	0	0	0	29
WESTWOOD RAINIER	C6SI3	Seattle	11	23	0	0	0	0	0	0	0	0	0	0	34
WESTWOOD VICTORIA	C6SI6	Seattle	44	35	0	0	0	0	0	0	0	0	0	0	79
WILFRED SYKES	WDA2769	Chicago	7	0	0	0	0	0	0	0	0	0	0	0	7
WILSON	WNPD	New Orleans	0	24	0	0	0	0	0	0	0	0	0	0	24
WOLDSTAD	KF001	Kodiak	17	5	0	0	0	0	0	0	0	0	0	0	22
WORLD SPIRIT	ELWG7	Seattle	30	57	0	0	0	0	0	0	0	0	0	0	87
YM GENOVA II	ELVX2	New York City	45	42	0	0	0	0	0	0	0	0	0	0	87
ZENITH	C6FU3	Miami	10	10	0	0	0	0	0	0	0	0	0	0	20
ZENITH	WBV3237	Kodiak	0	3	0	0	0	0	0	0	0	0	0	0	3
ZIM AMERICA	9HAB8	New York City	38	39	0	0	0	0	0	0	0	0	0	0	77
ZIM HONG KONG	9HGP7	Houston	7	16	0	0	0	0	0	0	0	0	0	0	23
ZIM ISRAEL	4XGX	New Orleans	62	37	0	0	0	0	0	0	0	0	0	0	99
ZIM ITALIA	4XGT	New Orleans	4	50	0	0	0	0	0	0	0	0	0	0	54
ZIM KOREA	4XGU	Miami	43	41	0	0	0	0	0	0	0	0	0	0	84
ZIM MEDITERRANEAN	4XFX	Kodiak	0	20	0	0	0	0	0	0	0	0	0	0	20
ZIM PANAMA	VSWW5	Miami	6	17	0	0	0	0	0	0	0	0	0	0	23
ZIM SHENZHEN	VQUQ4	New York City	0	16	0	0	0	0	0	0	0	0	0	0	16

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
TOTAL SHIPS: 596	14349	17811	0	0	0	0	0	0	0	0	0		32160

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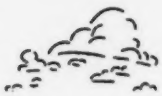

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